ISIS

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:: of Science and Civilization ::
Quarterly Organ of the History of Science Society and of the International Committee of the History of Science.

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„*Er* [SCHILLER] *wandte sich darauf zu* Nathan dem Weisen, *und nach seiner Redaktion, wobei er die Kunstfreunde gern mitwirken liess, erscheint das Stück noch gegenwärtig und wird sich lang erhalten, weil sich immer tüchtige Schauspieler finden werden, die sich der Rolle* Nathans *gewachsen fühlen. Möge doch die bekannte Erzählung, glücklich dargestellt, das deutsche Publikum auf ewige Zeiten erinnern, dass es nicht nur berufen wird, um zu schauen, sondern auch, um zu hören und zu vernehmen. Möge zugleich das darin ausgesprochne göttliche Duldungs- und Schonungsgefühl der Nation heilig und wert bleiben.*"

GOETHE: Über das deutsche Theater, 1815.
(*Propyläen-Ausgabe*, 28, 279-280, 1914.)

Summary of Isis Accounts for 1933

Expenditures			*Receipts*	
Printing	$ 2741.24		H. S. S.	$ 1628.00
Plates and figs.	48.35		C. I.	947.50
Mailing	620.61	$ 3410.20	Bruges	838.73
Royalties			Brussels	590.38
Reprints	152.84		Advt. (HSS)	200.00
Gifts	109.91	262.75	Sale odd nos.	5.50
Editorial exp.			Authors	3.40
Cambridge office	460.71			
Brussels office	359.33	820.04		$ 4213.51
		$ 4492.99		
			Total expends.	$ 4492.99
			Total receipts	4213.51
			Loss	$ 279.48

N. B.—This account is not entirely exact as I have not taken into account the continual fluctuations of the exchange. For the sake of simplification francs have been converted into dollars at the single rate of

1 fr. = 4.4 cts., or 1 dollar = 22.73 fr.

The members of the HSS have received in 1933, a total of 1126 pp., 8 pl., 7 figs., containing 22 memoirs, 62 shorter items and reviews and 2286 bibliographic notes. The cost of printing amounted to $ 2.48 per page (incl. pl., fig.); the total cost of publication (incl. *every* expenditure) amounted to $ 3.99, i.e., to less than $ 4.00 per page.

The previous account of *Isis* appeared in vol. 19, pp. 13-14.

The History of Science Society
Council Record

Meeting December 29, 1933, 4:30 P.M.

The Council of the History of Science Society met at the Widener Library, Harvard University, Cambridge, Mass., with Dr. J. PLAYFAIR MCMURRICH in the chair.

Present: Dr. MCMURRICH, President; Dr. ARCHIBALD; Dr. BARRY; Dr. BRETT; Dr. C. A. BROWNE; Dr. DAVIS; Dr. FOSTER; Dr. KLEBS; Dr. SARTON; Dr. SIGERIST; Dr. SIMONS; Dr. STIMSON; Mr. BRASCH, Secretary.

Minutes of the last meeting omitted.

Election of new officers and Council members. The following officers were declared elected for the year 1934: President, Dr. HARVEY CUSHING; Vice Presidents, Dr. CHARLES A. BROWNE, Dr. CHAUNCEY D. LEAKE; Members of the Council: Dr. RICHARD H. SHRYOCK, Dr. DOROTHY WALEY SINGER, Dr. C. A. KARPINSKI, Dr. CHARLES A. MORRIS, Dr. RAYMOND C. ARCHIBALD, Dr. FREDERICK BARRY (to replace Dr. HARVEY CUSHING on the Council to serve until 1935).

Report of Treasurer—Corresponding Secretary was read and approved. (Appendix I.)

Report of Editor of Isis. A communication with recommendations had been sent to the Council some weeks earlier than the time of the meeting. Situation between the Society and *Isis* is satisfactory at present. A lengthy discussion took place concerning *Osiris*, a title proposed by Dr. SARTON for a series of monographs to supplement *Isis*, such monographs to be papers sent in which would occupy too much space in the journal and yet which should be published. The sentiment was in favor of *Osiris* rather than the allotment to *Isis* of a definite supplementary sum of money. In either case, the appropriation would come

from the Revolving Book Fund. The matter was referred to the Publications Committee with the recommendation that the matter be settled by the Chairman of that Committee and the Editor of *Isis*. (Appendix II.)

Report of Publications Committee, Dr. BRETT, Chairman. (Appendix III.)

Statutes. Revision of the set of Statutes for the History of Science Society. Approved practically in toto. One of the paragraphs called for any change in the statutes to be approved by two-thirds of the total membership of the Council. Not yet in force because two-thirds of the members of the Council were not present. A copy of the new statutes will be sent around to all members of the Council and they will be asked to vote by mail. (Appendix IV.)

Meeting place for 1934. The Society will hold its annual meeting in Washington, D. C., in connection with the meetings of the American Historical Association, which association is to celebrate its 50th Anniversary.

Election of Secretaries for 1934. Mr. F. E. BRASCH was reelected Corresponding Secretary and Treasurer, and Dr. LAO G. SIMONS was reelected Recording Secretary.

Resolutions concerning Dr. Lyman C. Newell. Dr. C. A. BROWNE and Dr. TENNEY L. DAVIS were appointed to draft resolutions of sympathy regarding the death of this foundation member and former member of the Council to be sent to Mrs. NEWELL.

Meeting adjourned on motion at 6 : 00 o'clock P. M.

LAO G. SIMONS.
January 15, 1934. Recording Secretary.

ABSTRACT OF PAPERS
PROGRAM OF THE HISTORY OF SCIENCE SOCIETY MEETING
Cambridge, Massachusetts, 1933.

The History of Science Society held a joint meeting with Section L (A. A. A. S.) in the historic Harvard Hall at Harvard University on December 29, 1933 morning and in the Lincoln Room of the Widener Library in the afternoon of the same day.

The President, Dr. J. PLAYFAIR MCMURRICH, of Toronto, Canada, called the meeting together and gave a few short introductory remarks relating to the development of the study and teaching of the history of science in the United States, together with a brief history of the activities of the Society since its inception. This was the tenth annual meeting of the Society, and as the President noted, the Society was founded in Boston in 1924.

The first paper was by Dr. S. E. MORISON, Professor of History at Harvard University. Dr. MORISON spoke on the development of astronomy in the latter part of the 17th century at Harvard, and gave an interesting account of the history of Harvard Hall and its predecessor, where much important Colonial scientific thought was created and taught. Astronomy was the first science taught at Harvard and it was shown also that its tutors early recognized the Copernican system of astronomy. He spoke on the early text books used, which were primarily European, and the important part the famous Colonial almanacks played in the literature of the period. Harvard College possessed the first astronomical telescope to come to the Colonies. It was presented by JOHN WINTHROP, Jr., in 1672.

Dr. LAO G. SIMONS of Hunter College, New York City, traced the history of astronomy and mathematics during the whole of the 18th century as developed at Harvard, but more particularly throughout the Colonies, as far south as William and Mary College. The first observer of celestial phenomena of importance was THOMAS BRATTLE, a graduate of Harvard in 1676. He made particularly good observations for that period on the Comet of 1680, which were sent to the Astronomer Royal at Greenwich. These proved later to be of immense value to NEWTON and HALLEY in computing the first orbital elements of a comet, proving a stimulus to NEWTON in writing the great *Principia*. The principal scholars in astronomy and mathematics of the 18th century were Professor JOHN WINTHROP of Harvard, THOMAS ROBIE, DAVID RITTENHOUSE, and CADWALLADER COLDEN. They were the first to recognize the Newtonian philosophy and to teach fluxions and the *Principia*.

As for early chemistry and chemical industry, Dr. C. A. BROWNE of the U. S. Bureau of Chemistry and Soils traced the aboriginal

influence upon the Colonial efforts along these lines. Dr. BROWNE showed how the use of many minerals, medical plants, etc., were carried over from the Indians to the Colonists and even to England. The Europeans were also instructed by Indians in methods of dressing skins, in the use of puccoon, bloodroot, Brazil wood, cochineal and other natural products as dyestuffs, in the employment of rubber latex for waterproofing fabrics, and in the medicinal and narcotic properties of cinchona, jalap, coca, cascara, tobacco, and numerous other plants. The Indian method of preparing the arrow poison curare, as described by HUMBOLDT, is one of the best illustrations of a native chemical art.

In the afternoon session Dr. HENRY R. VIETS of Boston introduced new facts relating to the early history of medicine in Massachusetts. Medicine was promulgated for the first hundred years in the Colonies by three types of individuals, namely, governors, churchmen, and educators. Crude as this medicine was, more particularly when mixed with religious bigotry, it seemed to serve the people well. The outstanding medical practitioner of the 18th century was ZABDIEL BOYLSTON of Boston. He introduced the first treatment of inoculation against smallpox, and was invited to lecture before the Royal College of Physicians and the Royal Society, being elected a member of the latter group in 1726. Dr. VIETS continued the historical account of other brilliant physicians, among whom were WILLIAM DOUGLAS, a practitioner and writer of books and pamphlets; SILVESTER GARDINER, who was trained in London and studied in Paris (he established the first apothecary shop in Boston, in 1744); and finally JAMES LLOYD, trained in England, who began to practice obstetrics almost at once on his return to Boston and who was the first physician in this country to do midwifery upon a scientific basis. During LLOYD's later period many young men who graduated from Harvard College came under his influence and instruction.

The geological studies in the Colonies were not recognized due to the fact of their slow development as a science, although mining as developed by the Indians extended back many ages. Dr. FREDERICK K. MORRIS, of Massachusetts Institute of Technology, showed that there was one at least who was outstanding as a pioneer in that he gave correct interpretations of the causes

of earthquakes. Professor JOHN WINTHROP of Harvard College showed that earth tremors or movements were of the nature of wave motion or vibration. It was not until the early 19th century that geology as a science became free of theological implication. Dr. MORRIS illustrated his address by means of a large wall map showing various geological formations and periods in the Colonial area.

The final paper was a joint contribution from Dr. AUSTIN H. CLARK and LEILA FORBES CLARK of the Smithsonian Institution. The history of the American Association for the Advancement of Science was shown to have been patterned after the British Association, and its origin was traced back as far as 1847, when it was first organized as the Geological Association. The first meeting was in Philadelphia, and the Association became more fully developed in Cambridge in 1849. Dr. CLARK traced in detail the gradual growth of the American Association for the Advancement of Science up to its present enormous membership of 18,000.

The Program Committee for this meeting consisted of the following members of the Society: Dr. TENNEY L. DAVIS, Chairman; Dr. LAO G. SIMONS; Dr. DOROTHY STIMSON; Dr. JOHN F. FULTON; Dr. CHAUNCEY D. LEAKE; Mr. FREDERICK E. BRASCH, Secretary.

Many of the members of the Society attended the annual Sigma Xi address on Thursday evening the 28th at the Statler Hotel, given by Dr. HENRY E. SIGERIST, professor of the history of medicine and director of the Institute of the History of Medicine at the Johns Hopkins University. The topic was "The Foundation of human anatomy in the Renaissance."

Other members attended the 18th annual meeting of the Mathematical Association of America (Dec. 29, 1933) in Longfellow Hall, one of the beautiful new halls of Radcliffe College. Two addresses were of special interest to historians. Professor JULIAN L. COOLIDGE: The rise and fall of projective geometry. DR. GEORGE SARTON: The study of the history of mathematics.

We must still mention the meeting in Harvard Hall, Dec. 28, devoted to "A national policy for history sites and monuments," the chairman being Dr. JOHN C. MERRIAM, President of the Carnegie Institution of Washington, and the main speaker, VERNE

E. CHATELAIN, Chief Historian, National Parks Service, U. S. Department of the Interior.

TENTH ANNUAL REPORT OF THE CORRESPONDING SECRETARY AND TREASURER OF THE HISTORY OF SCIENCE SOCIETY FOR THE YEAR 1933

To the President and Council of the History of Science Society

Herewith I present the financial statement, together with the membership status of the Society, for the year beginning December 1, 1932, and ending November 30, 1933.

Total membership paying to Washington office Dec. 1, 1932	509
Total new members paying to Washington office for 1933	20
	529
Membership paid during 1933	387
Membership delinquent during 1933	85
Membership canceled during 1933	37
New members approved during 1933	20

RECEIPTS

From membership dues (including delinquents for 1932)	2035.00
Book Fund transfer for advertising, secretary, etc.	300.00
Sale of Williams & Wilkins books to members	51.00
Fund transferred by Secretary	100.00
	2486.00

EXPENDITURES

For Isis	1628.00
Advertisement	200.00
A. C. L. S. dues	25.00
Print.-Stat.	92.15
Secretary aid	201.00
Postage	64.50
Express	20.25
Exch.-Telegrams	3.00
Railroad fare	152.00

W. & W. books	51.00
Typewriter repair	3.50
Notary fee	2.00
Am. Men of Science	8.00
Total Expend.	2450.40
Total Receipts	2486.00
	35.60

Respectfully submitted
(signed) F. E. BRASCH.
Corresponding Secretary-Treasurer.

Simon Stevin of Bruges
(1548-1620)

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INTRODUCTION

1. I have taken pains to give an account of STEVIN's life and works which be as accurate and as complete as the scale of this memoir would permit, and I trust that historians of science will find it useful and that some of my brief statements will challenge

criticism. However, we need considerably more : STEVIN's personality is such a great one that a very full biography should be eventually devoted to it. Investigations in the Dutch and Belgian archives may clear up moot points. Some additional light may be expected from ISAAC BEECKMAN's diary, of which our learned colleague of Vlissingen, Mijnheer CORNELIS DE WAARD, has been preparing an edition for many years. And let us hope that when the *Hollandsche Maatschappij der Wetenschappen* has finally completed its magnificent edition of HUYGENS' works and correspondence, (1) begun almost half a century ago, it will undertake the building of a similar monument to the memory of STEVIN. This might be done with the cooperation of a Belgian society for STEVIN's fame belongs equally to both countries.

The present memoir is hardly more than an introduction to the study of this subject which, if we would try to follow all of its ramifications, would involve a survey of almost every aspect of scientific thought in a critical and fascinating age.

A complete bibliography of Stevinian publications would be exceedingly difficult and tedious, for his works were often issued in strange ways. There are plenty of bibliographical irregularities and niceties to enchant bibliomaniacs, and to disgust the historians who are more interested in ideas than in the accidents of printing and publication. I have tried to give enough information to identify and date exactly each work, and not much more.

My main purpose has been to state STEVIN's main achievements and I have tried to do so as clearly and concisely as I could.

2. The Flemish mathematician SIMON STEVIN was perhaps the most original man of science of the second half of the sixteenth century. I say " perhaps " only because of his contemporary GALILEO (1564-1642) who was at least as original. However the latter was sixteen years younger than STEVIN and outlived him twenty-two years; though some of his discoveries were made at about the same time as STEVIN's, they were published much later; the fundamental works upon which his fame is based appeared only in the seventeenth century; the two most important many years after STEVIN's death. Hence it is not quite proper to compare both men : they belong to two succeeding generations.

(1) See *Isis*, 21, 213-15.

Moreover, the great Fleming is distinctly a man of the second half of the sixteenth century, while his Italian peer represents admirably the first half of the seventeenth century.

If we leave GALILEO " hors concours," STEVIN was undoubtedly the most original man of the second half of the sixteenth century, but he has not yet received the full fame he deserves. This may seem strange, for his greatness is conspicuous and not only in a single domain but in many. On the other hand it may be argued that he has been neglected because of his very originality and that such neglect thus becomes a sort of confirmation of his genius. It can be shown that one of his fundamental ideas set forth by him in 1585—three centuries and a half ago—has not yet been grasped by a very large section of the civilized and intelligent people of our own time. And how could people truly admire one whom they do not understand, how could they consider great a man whose greatness they have not yet been educated to appreciate?

I. — STEVIN'S LIFE

3. STEVIN's life has not yet been thoroughly investigated and there are many obscure points relative to it which further studies might possibly elucidate. The little we know may be summed up as follows. He was born in Bruges in 1548, and was active for a time in Antwerp as cashier and bookkeeper; later he was employed in the financial service of his native city. Sometime after 1571 he left Bruges because he had failed to obtain a franchise from taxes on beer. He traveled in Prussia, Poland, Sweden, and Norway and finally established himself in the northern part of the Netherlands which had then already shaken off Spanish domination. In 1581, we find him in Leiden; in 1582, his first book appeared in Antwerp; and on the 16th of February, 1583 he was matriculated as a student of the University of Leiden. Later he taught mathematics at that University and the prince MAURICE OF NASSAU (2) was one of his pupils. By 1590 he was living in Delft, where he had undertaken to establish a new model of windmills for which he had received a patent *(octrooi)*

(2) MAURICE, count of Nassau, later prince of Orange and stadhouder of the United Provinces (born 1567, died 1625; stadhouder 1585-1625).

from the States-General in 1586; in 1592, he was put in charge of the " waterstaat " (waterways) of Delft.

4. He had been in communication at least since 1585 with the Delft patrician JOHAN HUGO CORNETS DE GROOT (3), for in that year he dedicated the *Arithmétique* to him. This JOHAN HUGO DE GROOT was deeply interested in mathematics and physics, and is many times mentioned by STEVIN (e.g., in the *Weeghconst* and the *Waterwicht* of 1586). During the latter's residence in Delft they had more opportunities of discussing scientific subjects together. It was probably then that they made experiments on falling bodies, disproving the Aristotelian idea that heavier bodies fall faster than lighter ones. (4)

5. In January 1593, upon the recommendation of the stadhouder MAURICE OF NASSAU (fig. 2) he was appointed by the States-General " castrametator," i.e., quartermaster general of the Dutch armies, a position which he held until the time of his death.

However, toward the end of his life, as he complained of the ungratefulness of the States-General, MAURICE OF NASSAU appointed him a member of his council and superintendent of financial matters.

In 1600, he organized the mathematical teaching at the engineering school attached by MAURICE OF NASSAU to the Leiden University (5),—that teaching being given in the national language, as opposed to the University itself where it was presumably given in Latin.

Prince MAURICE had a very genuine interest in mathematics (6) and his relationship with his tutor and technical adviser was

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(3) Or JANUS GROTIUS. Born near Delft 1554; died in Delft 1640. Father of the more famous HUGO GROTIUS (1583-1645). Burgomaster of Delft 1591-95, curator of Leiden University 1594. See CORNELIS DE WAARD in *Nieuw nederlandsch biografisch woordenboek* (vol. 2, 528-9, 1912).

(4) This is said by W. VAN DER WOUDE and P. J. BLOK (N.N.b.w., 5, 816, 1921), I do not know on what grounds. They further claim that STEVIN and the burgomaster DE GROOT made those experiments before GALILEO. I am not able to confirm either the anteriority or even the reality of their experiments. GALILEO's experiments took place while he was living in Pisa, 1589-92. It is not possible I believe to date them more accurately. See VINCENZO VIVIANI's account in *Opere di* GALILEO (FAVARO's edition, vol. 19, 606, 1907).

(5) After W. VAN DER WOUDE and BLOK (op. cit., 816).

(6) CAPPELLE (1821).

Pl. i, fig. 1 SIMON STEVIN G. SARTON

(By an unknown painter)

Pl. ii, fig. 2 MAURICE, prince of Orange G. SARTON

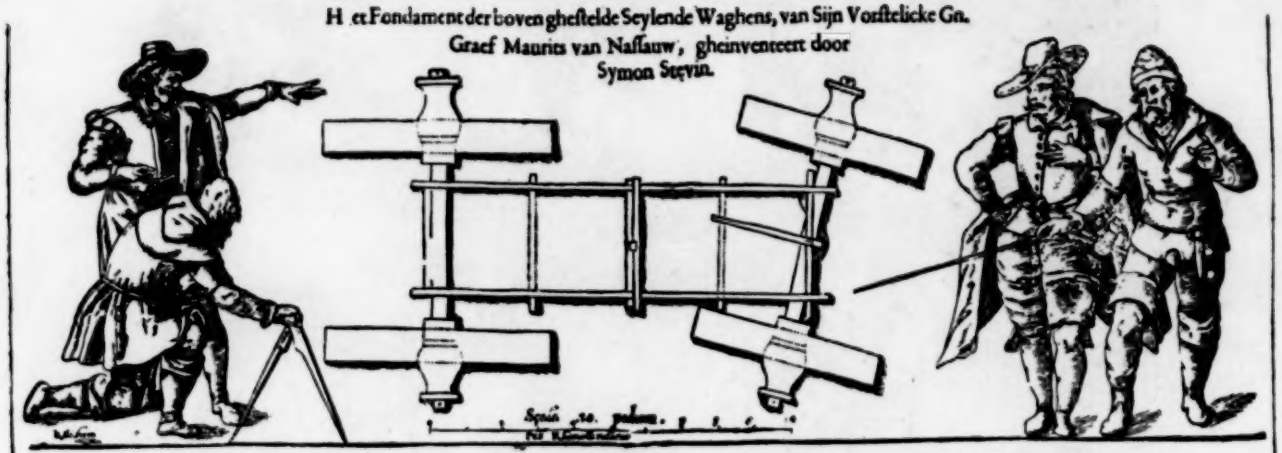
(Taken from the French *Castrametation.*)

Pl. iii, fig. 27

STEVIN's sailing chariots

(Engraving by JACQUES DE GHEYN (?), 1652)

G. SARTON


Het Fondament der boven gheſtelde Seylende Waghens, van Sijn Vorſtelicke Gn.
Graef Maurits van Naſſauw, gheinventeert door
Symon Stevin.
Wen vintse te coop tot Amſterdam by Claes Janſz. Visscher / woonende in de Calverstraet / in de Visscher / 1652.

Pl. iv, fig. 28 Chassis of STEVIN's sailing chariot G. SARTON

as intimate as it could be. A number of STEVIN's scientific writings were the fruits of that relationship. The Prince used to carry the manuscripts of them with him in his campaigns. Fearing that he might lose them, he finally decided to have them published, not only in the original Dutch text (*Wiscontighe ghedachtenissen*, 5 vols., 1605-8) but also in a Latin translation by WILLEBRORD SNEL (*Hypomnemata mathematica*, 5 vols., 1605-08) and in a French translation by JEAN TUNING (*Mémoires mathématiques*, only 3 1/2 vols. published 1605-8). It is true these memoirs might have been saved by the preparation of other manuscript copies, yet the printing of the Dutch text seemed advisable for three reasons clearly set forth in the preface which may be found in the three editions. As the French text is easier to read for most readers than either the Dutch or the Latin ones, I quote these three reasons from it :

" La premiere, que quelques uns, és mains desquels viendroient ces escrits, se pourroient attribuer nostre labeur & inventions; comme c'est chose qu'on voit bien arriver : A quoy le meilleur remede a semblé de les mettre en lumiere par le moyen de l'impression. La seconde, qu'il y auroit aussi cest avantage à attendre, que si quelques uns y rencontrent des fautes, ils les pourront corriger, et y joindre d'autres nouvelles inventions, profitables au public, & tendantes à plus grande satisfaction de celuy pour qui ces livres sont escrits. La troisiesme que, comme je declareray ci apres mon opinion estre que les grands arts & sciences ne peuvent parvenir à la perfection du siecle sage, si ce n'est que de grands peuples & nations s'y exercent en leur propre langue; puis que le present œuvre est formé avec esgard visant à telle fin, sans doute le recellement de ces livres n'accorderoit pas avec leur contenu, ni avec mon intention."

6. Late in life—he was then 64 years old—he married a young woman, named CATHARINA CRAEY. On March 28, 1612, he bought a house in The Hague; the house was not yet completely built when he acquired it but according to the contract it had to be delivered to him at the end of April. That house still exists in the Raamstraat no. 47 and is now marked with a bust of the great scientist. He obtained it presumably for the reception of the young wife whom he married in the same year. She gave him four children who were born in that house. FREDERIK, in 1613, HENDRIK, in 1614, and two daughters, SUSANNA and LEVINA. STEVIN died in 1620, presumably in The Hague and in that very house wherein we know that he spent the last years of his life. It is strange that the death of so great a man, a familiar

of the Prince, should have been almost unnoticed. However, the place, The Hague, is mentioned on the anonymous portrait which we reproduce (fig. 1), and if he had died away from his home, his death would have been probably more conspicuous.

CATHARINA did not remain a widow very long, for on February 28, 1621 she married MAURITS DE VIRY (or de VIRIEU), bailiff of Hazerswoude. They sold STEVIN's house on May 6, 1623 and established themselves in Leiden, where she died half a century later on January 5, 1673.

To return to the children. The eldest son FREDERIK was a student in Leiden and became a jurist; he died in Leiden in 1639, at the age of twenty-six. The second son HENDRIK, born a year after his senior in 1614, studied mathematical sciences in Leiden and became an engineer. He traveled in Bohemia, Italy, Belgium, Saxony— observing engineering matters everywhere. He was for a time quartermaster and engineer in the Dutch armies, until a wound obliged him to withdraw from such strenuous activities and to return to his studies. He established himself in Alphen (near Breda) where he was lord of a manor *(ambachtsheer)*. His interest in his father's work was much stimulated by the latter's eulogy in ADRIANUS ROMANUS' book : *Ideae mathematicae pars prima* (1593). He took considerable pains to collect his father's dispersed manuscripts and to publish them (see below 28-29). He shared his father's enthusiasm for the Dutch language and carried it to the point of fanaticism, for he was anxious not only to promote its study but also to exclude the teaching of Latin from the Dutch schools (a very bold proposal in his day). He claimed that every subject should be taught in the mother tongue and that foreign languages were of no use except to people who wanted to travel abroad and to study foreign cultures. He spent the end of his life in Alphen. He was in correspondence with CONSTANTIJN and CHRISTIAAN HUYGENS and with other mathematicians. He died after 1668.

7. In July 1846 a modest but beautiful monument was erected to STEVIN's memory in his native city, Bruges. This was the occasion of a long and heated controversy as to his loyalty to his fatherland and religion. (7) Looking at it from a distance

(7) An account of it will be found in the *Bibliotheca Belgica* (vol. 23, note on the *Vita politica*, S. 132, Ghent 1880-90, with bibliography).

that controversy seems particularly futile. When he was serving the Prince of Orange, STEVIN was helping him to fight not Belgium, but Spain. Did he become a Protestant? This is possible but unproved. In the *Vita politica* he recommends that one should practice one's own religion in secret if it be different from the Prince's, and not to disturb the public order. If he remained faithful to the Church of his baptism, he was a crypto-Catholic according to his own definition. If so, he would deserve some measure of blame, because Prince MAURICE was revolting not only against Spain but also against the Roman Catholic Church. Considering the general bent of his mind it is probable that he had little interest in theological differences. Moreover, had he not witnessed the intolerable excesses committed by Spain in his native land in the name of orthodoxy? In any case it is not true that he made a legacy to the church of Westkerke to pay for masses : (8) The man who made that legacy being a namesake who died in 1434.

II. — STEVIN'S WORKS

8. (S. 124). (9) *Tafelen van Interest, midtsgaders de constructie der seluer* (Tables of interest, together with their construction). 92 p. Antwerp, 1582. (In Dutch). For title-page see fig. 3.

Pp. 9-34 contain an account of the different kinds of interest and explain the composition of the tables; p. 35-59, tables of compound interest and notes relative to them; p. 60-92, applications. According to the author's own statement in his preface (dated Leiden, July 16, 1582), the inventor of these tables was JEAN TRENCHANT, who gave a specimen of them in his *Arithmétique* (Lyon, 1558). (10)

(8) A denial of this fact is necessary because it was adduced by no less an authority than MORITZ CANTOR in his articles on STEVIN in the *Allgemeine deutsche Biographie* (vol. 36, 158-60, 1893) and in the *Encyclopaedia Britannica* (11th. ed. 1910, 1 ½ col.). It is no longer found in the 14th ed., the Editor having decided that STEVIN did not deserve so much space and telescoped CANTOR's article to one third of its original length.

(9) This number and the corresponding ones below refer to the notices in vol. 23 of the *Bibliotheca Belgica* (Gand, 1880-90) where additional information may be obtained. I have tried to give all the information which is of real interest to the historian of science, as opposed to the bibliographer and the bibliophile.

(10) *L'Arithmétique de* IAN TRENCHANT *départie en trois livres. Ensemble un*

A French translation of STEVIN's tables was published in his *Pratique d'arithmétique* (Leiden 1585, 1625) mentioned below, and reprinted in GIRARD's edition (1634), though without the preface.

Judging from GIRARD's publication (for I have not seen the original Dutch book), there are sixteen tables of interest from 1 % to 16 %, each for n years (n = 1 to 30). Each table is divided into three columns, of which the first gives the number n, the second the capital which will be worth, together with the compound interest, 10.000.000 after n years, the third the value of n annuities of 10.000.000 at the beginning of the first year (of course the numbers of the third column are simply the totals of the numbers of the second column down to that year).

These tables are followed by seven others entitled " Table d'interest du denier n " (n = 15 to 19, 21, 22). The " table du denier 20 " is not given as it is identical with the table of interest for 5 %.

STEVIN's tables were the first to appear in print but of course manuscript tables of the same kind had been used by bankers long before his day. The earliest we know of were compiled c. 1340 by FRANCESCO BALDUCCI PEGOLOTTI for the great commercial firm BARDI of Florence, and included in his treatise *Libro di divisamenti di paesi e di misure di mercatanzie* (or *Pratica della mercatura*) and edited by GIAN FRANCESCO PAGNINI : *Della decima e di varie gravezze imposte dal comune di Firenze* (4 vols., Lisbona and Lucca, 1765-6; in vol. 3). The use of such tables was transmitted from Italy to other countries, chiefly those like the Netherlands where the commercial activity was greatest, but their diffusion was probably slowed up by the fact that bankers having them would be likely to consider them as secret tools of their trade, and at any rate would have no interest in communicating them to their rivals.

9. (S. 125). *Problematum geometricorum libri V* (118 p.) Antwerp (s. a., 1583). For title-page, see fig. 4.

Collection of geometrical problems arranged in the following order : Book I. Division of polygons *(a)* by a line passing

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petit discours des Changes, avec l'art de calculer aux getons. This work was very popular being printed at least 16 times within a century. The author is otherwise unknown. See my query no. 38 in *Isis*, 21, 207-9, 1934.

through a point of the perimeter or *(b)* by a parallel to one of the sides. Book II. Application of the *regula falsi* to mensurations. Book III. Regular polyhedra and semi-regular polyhedra which can be inscribed in a sphere (quinque corpora regularia, quinque aucta corpora regularia, novem truncata corpora regularia). Book IV. Construction of a solid similar to another, and equal in volume to a third. Book V. Construction of a solid similar to two others and equal in volume to their sum or difference. STEVIN's references to EUCLID are to the CLAVIUS edition of Cologne 1574. An elaborate analysis of this work was published by GRAVELAAR in 1901.

10. (S 126 and 127). *Dialectike ofte bewysconst. Leerende van allen saecken recht ende constelick oirdeelen; oock openende den wech tot de alderdiepste verborghentheden der natueren* (12 l., 172 p.) Leiden 1585 (in Dutch). For title-page, see fig. 5.

This is a treatise on " dialectics and the art of demonstration " which the author composed in the form of a dialogue between PIETER and JAN (PIERRE et IEHAN). STEVIN was deeply convinced of the actual or potential superiority of the Dutch language over all others, yet he realized the temporary insufficiency of the Dutch scientific terminology, and tried to remedy it. The *Bewysconst* includes (p. 134-40) a Latin-Dutch glossary of logical terms.

The need of technical books in Dutch at that time is illustrated by the contemporary publication of two other ones. NICOLAS PETRI of Deventer : *Practique om te leeren rekenen, cijpheren ende boeckhouwen*. Amsterdam 1583. (Arithmetic including book-keeping) and the anonymous *Ruygh-bewerp vande redenkaveling ofte nederduytsche dialectike*. Leiden 1585 (on dialectics). Such books were in demand because there was a group of people constantly increasing in numbers and importance—merchants, bankers, etc.—who did not know Latin yet were keen to obtain useful knowledge.

STEVIN's book was published a second time in Rotterdam 1621. This edition does not seem to differ at all from the first, except with regard to the orthography.

STEVIN refers to the *Bewysconst* in his *Thiende* (see our facsimile p. 157).

11. (S 128). *De Thiende*. 36 p. Leyden 1585.

The tithe. I shall discuss this book more fully in another paper.

12. (S 129, 130). *L'Arithmétique et la Pratique d'Arithmétique* (2 vols., 9 l. + 642 p. + 7 l., 203 + 12 p.). Leiden 1585.

See facsimiles of the two titlepages (the first title is very long) in my second paper.

Vol. 1 contains the arithmetic in two books; then a French translation of the first four books of the algebra of DIOPHANTOS (free version from XYLANDER's Latin text, 1575). This was the first translation of DIOPHANTOS in any European vernacular.

Vol. 2 *(Pratique)* contains rational computations, then proportional computations. Then : rule of three, rule of five, rule of company (i.e., compound proportion), rule of alligation, rule of interest and tables of interest (translation of item in § 8), rule of false position, the tithe (translation of item in § 10), surds and explanation of book X of EUCLID's Elements. (11)

At the end of the *Pratique*, the author mentions two friends of his, JOHAN CORNETS DE GROOT (father of HUGO GROTIUS) who is helping him for his statics, and LUDOLF VAN CEULEN, with whom he is constantly discussing mathematical subjects.

This work though very original is based to a large extent upon the writings of CARDANO, TARTAGLIA, BOMBELLI, and to a lesser extent upon those of RUDOLF, STIFEL, and PEDRO NUÑEZ.

A revised edition of the *Arithmétique* was prepared by ALBERT GIRARD (Leiden 1625). GIRARD added to it a translation from the Greek of books 5 and 6 of DIOPHANTOS and STEVIN's Appendice quoted below (§ 15); he made also a few other changes of no importance. GIRARD's edition was reprinted without ulterior modification in the *Œuvres* of 1634 (vol. 1).

13. (S 131). (a) *De Beghinselen der Weeghconst* (18 l., 95 p.) Leiden 1586.

Treatise on statics divided into two parts dealing respectively with principles and the determination of centers of gravity.

(b) *De Weeghdaet* (43 p.) Leiden 1586.

Praxis artis ponderariae. Statical applications.

(c) *De Beghinselen des Waterwichts* (81 p.) Leiden 1586. Principles of hydrostatics. For the three title-pages, see figs. 6-8.

(11) A propos of this last part see M. MERSENNE : *Traité des quantités incommensurables... Les erreurs de S.S. réfutées* (anonymously published in Paris 1640).

These three booklets are quoted together as they were published together by the same publisher with the same woodcut and motto "*Wonder en is gheen wonder*." Though independent they may be considered three parts of the same book, sold separately for commercial or other reasons.

The three pamphlets were reprinted by STEVIN under the single title *Weeghconst* in his *Wisconstighe ghedachtenissen* (vol. 4, 1605). He was planning to write two others, including one on aerostatics, but failed to do so.

In the first and third STEVIN reiterates his conviction of the excellence of the Germanic languages. According to him Dutch is the best language for scientific purposes because it combines briefness with clearness. He maintains that in that respect Dutch is superior to Greek and Latin, and in proof of his assertion quotes the Latin translation by FEDERICO COMMANDINO of two propositions of APOLLONIOS of Perga covering no less than 36 lines and adds a Dutch translation covering only 9 lines. He announces his intention of translating APOLLONIOS into Dutch, a purpose which he could not fulfill.

According to him the superiority of Germanic languages, and particularly of the Dutch, was due not only to their brevity and richness in monosyllables, but also to their lending themselves so well to the creation of intelligible compound words (12), to their convenience for technical purposes, and finally to their moving power. As an illustration of the latter he mentioned the existence of so many religious sects in the Germanic lands! STEVIN was arguing in a strangely egocentrical way, and did not realize that the power of the Dutch language to move him was essentially due to the fact that it was his mother tongue, his very own. He came back to this question in his Geography, and also in the Preface to his *Hypomnemata* (13). He was a poor philologist—and not in any sense a humanist but rather the opposite—yet he discovered the fundamental argument for the justification of any language however unimportant that language may seem as compared with other ones: that the full spiritual development of a people can only be accomplished by means

(12) E.g. hoekmaet for sine; aardrijkskunde for geography; wiskunde for geometry.

(13) See *Praefatio* and *De renovatione eruditi seculi* (2 membrum, etc.).

of its own language (see end of the French preface quoted above in § 5).

It may be added that STEVIN's claims for the Dutch language were also justified in his day by the political and economic leadership of the Dutch people—that is, not STEVIN's own countrymen but those who had freed themselves from Spain and Rome: this was the true Golden Age of the Seven United Provinces.

14. (S 132, 133, 134). *Vita politica. Het burgherlick leuen* (56 p.) Leiden 1590 (in Dutch). For title-page, see fig. 9.

Treatise on civics which the author composed 1° because he considered it more necessary than ever in those troubled times that every citizen should know his duty, 2° because it gave him a new opportunity of using the Dutch language and enriching it. He had to solve problems of terminology similar to those of his Dialectike. In some cases he puts in the margin the Greek and Latin equivalents of the Dutch terms used by him.

The *Vita politica* is divided into eight chapters: 1. Definition of civic life; 2. What is the foremost authority of the state; 3. How to determine the political party which one should join; 4. Civic duties of people in authority; 5. How should the citizen behave with regard to the laws which are not considered obligatory, but rather doubtful or contradictory; 6. Whether religion is necessary or not; 7. Rules of conduct in religious matters; 8. Civic life in general.

This table of contents, naked as it is, helps us to realize how difficult it was to be a good citizen in those days, for many issues were uncertain, and there were many conflicting duties. The main difficulties—the religious ones—are discussed in the two final chapters. It is in those chapters that STEVIN recommended that people who did not share the Prince's religion should conform outwardly and avoid any disturbance of the public peace (see our § 7). It is very easy to criticize that theory to-day, but it was probably the wisest in STEVIN's time and place.

The *Vita politica* was reprinted many times: Delft 1611, Middelburg 1658, (with a long appendix), Amsterdam 1684 (without the appendix; reimpression of the first two editions); again in the *Materiae politicae* edited by STEVIN's son (with the appendix).

15. (S 135). *Appendice algébraique contenant règle générale de toutes Equations* (3 l.) Leiden 1594.

Supplement to the *Arithmétique*.

This is one of STEVIN's most important publications : it includes a general rule to solve numerical equations of every degree. Expressed in modern language : if $f(a) > 0$ and $f(b) < 0$, there is between a and b at least one root of the equation $f(x) = 0$. At the end of this short paper STEVIN announced that his friend LUDOLPH VAN CEULEN had also found a general rule for the same purpose and that he had promised to publish it. LUDOLPH VAN CEULEN has not kept his promise but judging from his treatise *Van de circkel* (Delft 1596) he could solve numerical equations of any degree. Another friend of STEVIN's, ADRIAN ROMANUS, could also solve them (see his *Idea mathematica*, Antwerp 1593). STEVIN was the only one who published his method, and he thus deserves full credit for it.

The unique copy of the *Appendice*, kept in the University Library of Louvain was lost when that library was destroyed by the Germans in 1914. However, the text has been preserved for it was reprinted in the second edition of the *Arithmétique*, in the Dutch, Latin, and French editions of the *Hypomnemata mathematica* (see *Hypomnemata* ,vol. 5, p. 7-9, *Datis tribus* etc.); and in GIRARD's *Œuvres* (Arithmétique, p. 88).

16 (S. 136, 137). *De Sterctenbouwing* (4 l., 91 p.) Leiden 1594 (in Dutch). For title-page, see fig. 10.

Treatise on fortification which the author composed in Dutch because he was anxious to serve his countrymen, and also because (so he said), the Dutch language was especially adequate for technical purposes. His opinion on the subject is fortified by some remarks of CARDAN (*De subtilitate*, book 2). This treatise was much praised by the famous Belgian military engineer, HENRI ALEXIS BRIALMONT (1821-1903) in an appendix to STEICHEN's *Mémoire* (1846).

Reprinted, Amsterdam 1624. German translation, *Festung-Bawung*, by GOTTHARD ARTHUS (1570-after 1630) of Danzig (Francfort a.M., 1608, again 1623). French translation by GIRARD in the *Œuvres mathématiques*.

17. (S. 138, 139). *De Havenvinding* (28 p.) Leiden 1599. For title-page, see fig. 11.

The States-General gave the printer, CHRISTOFFEL VAN RAPHELENGEN, by privilege dated March 18, 1599 the exclusive right for six years to print and sell this book in any language. The printer himself expressed his intention of publishing it in Latin, French, Dutch and other languages.

Treatise explaining to sailors how to determine their landings by means of the compass. According to the preface, MAURICE OF NASSAU had ordered all the sea captains to make observations of magnetic deviation and to report them to the admiralty.

The treatise includes a table *(Tafel der naeldwijsinghen)* giving the deviation, latitude, and longitude of some 43 places. The longitudes are very erroneous, the average error amounting to 6° 5. (14) The table is arranged in a curious manner. The places quoted are divided into four regions: first " percx " on the northside, second " percx " on the northside, first " percx " on the south side, second " percx " on the south side (excepting Goa, Cochin and Canton). In the first, the deviation is easterly, it increases from 0 to 13.24 then decreases to 9.30; in the second, it is westerly and increases from 0 to 33 then decreases to 26; in the third, it is easterly and increases from 0 to 19 then decreases to 2.30; in the fourth it is westerly and increases from 0 to 22 (15) then decreases to 0. According to STEVIN himself (Definition 1) the data were collected by PETRUS PLANCIUS (16) and credit for this invention *(havenvinding)* should thus be given to the latter. After perusing this little book I cannot help feeling that STEVIN had at first greater hopes in the practical value of deviation than later experiments known to him justified; he then restricted the scope of his method: the determination of deviation could not replace that of longitude in general navigation; yet it would be useful to identify one's landings. Even that modest hope had to be abandoned later on.

STEVIN's moderation will be better appreciated by reference to the contemporary theories attempting to establish a regular

(14) MARGUET, 1931, 60.

(15) With one irregularity: 13, 16, 15, 22.

(16) PIETER PLATEVOET, Dutch preacher and geographer (1552-1622). See elaborate biography by A. A. VAN SCHELVEN in *Nieuw Nederlandsch biografisch woordenboek* (4, 1077-86, 1918), wherein the *Havenvinding* is wrongly ascribed to PLANCIUS. This PLANCIUS is said to have drawn a map on MERCATOR's (or rather WRIGHT's) projection in 1594, but that map is lost (MOTTELAY 1922, 560).

connection between variation and longitude : thus GIAMBATTISTA DELLA PORTA in his *Magia naturalis* (see edition of Naples 1589, p. 143) and others leading to the extravagant treatises of the Languedocian GUILLAUME LE NAUTONIER : *Mécographie de l'eymant. C'est à dire la description des longitudes trouvées par les observations des déclinaisons de l'eymant* (Venes 1603) and *Mécométrie de l'eymant. C'est à dire la manière de mesurer les longitudes par le moyen de l'eymant* (Paris 1602, Venes 1603) (or both books together dated 1604). (17) That intrepid theorician did not hesitate to draw a magnetic chart of the world *a priori !*

STEVIN published *De havenvinding* anonymously but included a revised edition of it in his *Wisconstige gedachtenissen* (1, 163-75). A part of the original text is included in the *Rara Magnetica* edited by GUSTAV HELLMANN in his *Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus* (no. 10, Berlin 1897). HELLMANN's reprints contain a facsimile of the Dutch title-page, the " *Tafel der naeldwijsinghen* " and " *Hoemen het noortpunt en naeldwijsing vindt*", 2 figs. (the text is not a facsimile reproduction).

A Latin translation by no less a person then HUGO GROTIUS was published by the same publisher in the same year :

Λιμενευρετικη sive, Portuum investigandorum ratio. Metaphraste HUG. GROTIO Batavo (6 l., 21 p., 1 p.) Leiden 1599.

This text was reprinted in the *Hypomnemata* after revisions bringing it into agreement with the revised Dutch text published in the *Wisconstige gedachtenissen.*

An English version was made by EDWARD WRIGHT (1558?-1615) on August 23, 1599. :

The Haven-finding art (cover, 7 l., 27 p.) London 1599. There is a copy of this book in the Library of Congress and I examined another one in the Huntington Library in San Marino, California (see fig. 12). This translation was reprinted in the third (posthumous) edition of WRIGHT's *Certain errors in navigation detected and corrected* (London 1657, 20 p. at end), but not in the first and second editions of that book (1599, 1610).

The *Haven-finding art* of 1599 begins with an *Epistle dedicatorie*

(17) MARGUET (1931, 98). This question—variation vs. longitude—is very interesting but equally intricate. See MOTTELAY (1922, 63). Mme. PAUL TANNERY : *Correspondance du* P. MARIN MERSENNE (vol. 1, 202, 207, 1933).

to the Lord High Admiral of England, which includes a reference to the discovery of the inclination by ROBERT NORMAN (1576, published in his *Newe attractive*, 1581).

A French edition had been planned from the beginning, but was not published separately. It is included under the title *Du Trouve-port, ou la maniere de trouver les Havres*, in GIRARD's *Œuvres* (vol. 2, 171-76, 1634).

18. (S. 140, 141, 142, 144). *Wisconstige Gedachtenissen, inhoudende t'ghene daer hem in gheoeffent heeft...* MAURITS *Prince van Oraengien* (2 vols. folio, very complicated pagination) Leiden 1605-1608 (in Dutch). For title-pages, see figs. 13-14.

This contains the substance of the lessons which STEVIN gave Prince MAURICE on a great variety of mathematical subjects; it is a sort of mathematical encyclopaedia. The Prince used to carry manuscript copies of these lessons with him in his campaigns and on one occasion he almost lost them. He then decided to have them published not only in the original language, Dutch, but also in Latin and French translation. This was done except that the French translation, or at any rate its publication, remained incomplete.

The titles of the Latin and French editions are :

Hypomnemata mathematica, hoc est eruditus ille pulvis, in quo se exercuit... MAURITIUS *princeps auraicus... A* SIMONE STEVINO *conscripta, & e Belgico in Latinum* a VVIL. SN. *conversa* (5 vols. folio, very complicated pagination). (18) Leiden 1605-8. For title-pages, see fig. 15-16.

Mémoires mathématiques, contenant ce en quoy s'est exercé MAURICE *Prince d'Orange... Descrit premierement en Bas Alleman... translaté en François par* IEAN TUNING (4 parts in one vol.) (19) Leiden 1605-8. For title-page, see fig. 17.

The French translator, JEAN TUNING was secretary to Prince FREDERIK HENDRIK OF NASSAU (1584-1647), MAURICE's young brother; he was born in Leiden and matriculated at the University of Leiden in 1593.

(18) The copy I used in the Harvard Library is bound in one thick volume (30 × 20 × 10 cm.).

(19) The copy available to me in the Harvard Library is incomplete. It contains only vol. 1, 1608, Cosmographie, 180 p. (incomplete); and Vol. 2, 1605 Practique de géometrie, 132 p.

It is remarkable that on the Latin title page STEVIN's language is caled " Belgian " (20)—a term new to me in that acceptation—and on the French title page, " Low-German." The second designation is not incorrect, and tallies with the official name " Netherlandish." The first is stranger. Of course STEVIN's mother tongue was Flemish, but it is possible that it had been somewhat Dutchified during his long residence in Holland : this question might interest philologists but I cannot stop to consider it. It will suffice to remark that Flemish is a dialectical form, or rather a collection of dialects, closely related to the Dutch dialects. Flemings and Dutchmen use the same grammars and dictionaries; the Flemish and Dutch languages are not more different than the American and the English languages. In other words, —for almost every purpose we may consider them as a single language. One wonders then what was the intention of the Dutchman who called STEVIN's language " Belgian "; or maybe he had none.

The Latin translation was made by WILLEBRORD SNEL VAN ROYEN (21), Dutch mathematician, geodesist and physicist. According to HUYGENS it was SNEL who first discovered and discussed in his lectures at the University of Leiden the fundamental law of refraction later published (without experimental proof) by DESCARTES (1637). SNEL translated the whole of STEVIN's *Wisconstige gedachtenissen*, except that the text of the *Liber quintus geographiae De limenheuretica* is simply a revision of HUGO GROTIUS's version.

For scientific purposes the Dutch and Latin texts are equivalent. As the Dutch text is not available to me, and the Latin text is easier to consult by the majority of readers, I shall take the latter as the basis of my analysis. It must be understood that each treatise exists not only in Dutch, but also in French, unless I state the contrary.

19. With regard to the date it should be noted that the publica-

(20) ADRIAAN VAN ROOMEN, speaking of STEVIN's language in his *Idea mathematica* (1593), also calls it " lingua belgica." HENDRIK STEVIN, SIMON's son, translating this very passage into Dutch, calls it " nederduytsche taal." "Lingua belgica" is Latin purism, just as " lingua sarmatica " to mean Russian.

(21) WILLEBRORD SNELLIUS (1580-1626). The original Dutch name is SNEL, not SNELL. See elaborate biographical notice by CORNELIS DE WAARD : *Nieuw nederlandsch biografisch woordenboek*, 7, 1155-63, 1927.

tion of the three editions—Dutch, Latin and French—was begun in 1605 and completed in 1608. In each case the title of the first volume bears the date 1608 (see figs. 13, 15, 17), which simply means that that title-page was printed last. I have examined more closely the Latin edition, the only one which was completely available to me (I used also a part of the French one), and in that edition the main title-pages of vols. 1 and 5 bear the date 1608, and those of vols. 2 to 4, the date 1605, but vol. 1 is divided into three parts of which the first and third are not dated, but the second is dated 1605. Hence vols. 1 to 4 of the Latin edition were probably printed in 1605, except two parts (Parts 1 and 3 of vol. 1), which may have been printed at any time between 1605 and 1608; while volume 5—which is in the nature of a general supplement—was probably issued in 1608. After the work had been kept on the stocks almost four years the printer became impatient and the publication was completed somewhat abruptly. This is explained at the end of it (see vol. 5, 205 of Latin edition, also end of my § 24).

20. The *Hypomnemata* are divided into five volumes which we shall now examine in due order.

Vol. 1. Cosmography (*Tomus primus de Cosmographia*, 1608). This is subdivided into three parts (each with its own pagination !) : *(a)* Trigonometry in four books (343 p.); *(b)* geography in six books (188 p.); *(c)* astronomy in three books (335 p.); that is, in all 866 p. not counting many unnumbered leaves.

(a) Trigonometry *(Pars prima cosmographiae de triangulorum doctrina)*. No date on separate subtitle page. Book 1. De sinuum canonibus fabricandis. Construction of tables of sines, tangents and secants, together with such tables. The tables were not reprinted in GIRARD's *Œuvres*, GIRARD having published independent tables (The Hague 1626) which were far more convenient. Book II. De triangulis planis (plane trigonometry). Book III. De sphaericis triangulis (spherical trigonometry). Additamentum. De sphaericis multangulis. Appendix doctrinae triangulorum. Book IV. De cœlestium sphaerarum problematis, quae ex calculo sphaericorum triangulorum solvuntur (trigonometrical applications to astronomical problems).

STEVIN's trigonometry was partly translated and published in German (S. 144) :

SIMONIS STEVINI *Kurtzer doch grundlicher Bericht von Calculation der Tabularum Sinuum, Tangentium und Secantium...* (Nuremberg 1628).

This translation was made by, or under the auspices of, DANIEL SCHWENTER (1585-1636), professor of oriental languages and mathematics in Altdorf, who wrote an introduction to it. It covers only the first book of STEVIN's trigonometry, less the tables, and the beginning of book II. Apparently SCHWENTER (or the translator) did not have access to a complete copy, for he quotes in his preface four axioms of BARTHOLOMAEUS PITISCUS concerning spherical angles, because (so he says) STEVIN has entirely neglected that subject. It would thus seem that SCHWENTER knew only of the first two books, and this would suggest that the publication of STEVIN's works was even more fragmentary than we realize otherwise. The second part of SCHWENTER's edition contains tables of sines, tangents, and secants, calculated with reference to a radius divided into 10.000.000 parts, by JOHANNES PRAETORIUS.

(b) Geography, 1605 *(Secunda pars cosmographiae de geographia)*. Not translated into French except book V, but there is a complete French translation in GIRARD's *Œuvres* (vol. 2, 104-83, 1634). Book I. De geographiae definitionibus generatim (p. 1-45, general definitions).

This includes some extraordinary developments on the "*eruditum seculum*," a mythical age of learning and wisdom.(22) STEVIN's belief in the existence of that golden age is justified by arguments largely drawn from the history of ancient science (p. 8-14), and is bolstered up by a series of testimonies culled out of the ancient literatures by HUGO GROTIUS. (23) Finally he draws up a program of efforts which may lead to the restoration of that time of wisdom, and manages to introduce into this a new vindication of his own

(22) " Eruditum seculum dicimus, quo mirabilis quaedam scientia hominibus nota fuit, quod certis quibusdam signis certo quidem, sed nec apud quos, aut ubi locorum, aut quando extiterit cognoscimus " (p. 8). See also end of the preface to the *Mémoires* quoted above (§ 5).

(23) Testimonia aliquot perantiqui et sapientis cujusdam aevi a HUGONE GROTIO collecta (p. 15-16). A French version of STEVIN's lucubrations on the age of wisdom may be read in GIRARD's *Œuvres* (2, 106-25) together with GIRARD's strange commentary. GIRARD's attack of the French language in a French book is certainly curious.

beloved language—together with tables of Dutch, Latin and Greek monosyllables, to illustrate what he considered to be one of the chief merits of the Dutch language, its great richness in monosyllables and its concision. (24)

The idea of a primordial golden age is one of the oldest conceits of the human mind. Our Edenic belief or dream is but one of its forms, and that particular form can be traced back to Sumerian times. (25) The fact that such strange ideas may be found alongside others of the purest scientific kind is but another illustration of the infinite complexities of the human mind. No man is always consistent, certainly no man of genius; or to put it otherwise, when consistency exists it is more often than not combined with mediocrity.

Book II. De hylocinesi terrestris globi (p. 47-67; on material changes of the earth). Much of this would be classified today under the heading of geology. Book III. De terrestri atmaeoria (26) (p. 69-81; on the height of clouds). Dealing with the height of the atmosphere with reference to IBN AL-HAITHAM as translated by GERARD OF CREMONA and to PEDRO NUÑEZ (1492-1577). Book IV. De histiodromia (27) (p. 83-159; on the road followed by a sailing boat). Problem of the loxodromic line and tables ad hoc, Canones loxodromicorum. Book V. De limenheuretica (28), metaphraste HUG. GROTIO (p. 161-173). See our § 17, Book VI. De theoria maritimorum aestuum in accessu et recessu (p. 175-83; on tides).

(c) Astronomy *(Cosmographiae pars tertia de cœli motu)*. No date on separate subtitle page. Not available in French, except later in GIRARD's *Œuvres*. Book I. De investigatione motus planetarum syderumque coelo affixorum ex observationum Ephemeridibus stante et quiescente terra (p. 1-114; Study of stellar and planetary motions on the hypothesis of the fixity of the earth). Book II. De investigatione motus planetarum ex ratiocinio mathe-

(24) Another example of a similar incongruity (irrelevant defense of the Dutch language in a scientific argument) may be read in the *Thiende*. See our facsimile of the French translation (p. 157).

(25) G. CONTENAU: Manuel d'archéologie orientale (Paris 1927, [315; *Isis*, 20, 474-78).

(26) Vaporium altitudine.

(27) De velificationis cursu quam dixeramus Nausiporiam.

(28) Portuum investigandorum ratione.

matico ad commentitiam stantis terrae hypothesin derivata (p. 115-231). Mathematical calculations on the same basis. Book III. De investigatione motus planetarum ex ratiocinio mathematico ad veram et naturae rerum consentaneam motae Terrae hypothesin derivata (p. 233-335). Same study on the correct Copernican hypothesis. Additamentum motus latitudinis quinque planetarum, Saturni, Iovis, Martis, Veneris & Mercurii secundum stantis Terrae hypothesin (p. 297-309). Appendix de ignorato planetarum motu ab Ptolemeo notato & animadverso : deque COPERNICI theoricis inde constitutis (p. 310-35). This ends the Tomus primus, which is somewhat larger than the four other tomi put together.

21. Vol. 2. Geometry (*Tomus secundus de geometriae praxi*, 184 p., 1605). In six books of which only books I to IV are translated into French (The French translation of books V and VI was added later by GIRARD in the *Œuvres*). This work is different from the *Problemata geometrica* and inferior to it; it is also a collection of geometrical problems but it is not arranged as logically as the former; it was chiefly made to complete the Prince's geometrical training. (29) Book I. De magnitudinum descriptione. (p. 5-44). Book II. De magnitudinum dimensione (p. 45-89). Book III. In magnitudinum additione, subductione, multiplicatione et divisione (p. 91-109). Book IV. In magnitudinum proportione (p. 111-22). Book V. De sectione proportionali (p. 123-53). Book VI. De magnitudinum in alias 'ομογένεας transformatione (p. 155-184).

22. Vol. 3. Optics (*Tomus tertius de optica*, 100 p., 1605). The Dutch original text is entitled *Van de deursichtighe* (perspective); this illustrates an equivocation which can be traced back to mediaeval times (30). STEVIN planned to write three books which are announced at the beginning of this volume (31), yet only two appear in the Dutch and Latin editions. As to the French edition, it includes only the first book, and this book was not even translated until the end (There is a French version

(29) Argumentum (p. 3) : Cum mecum geometriae πράξιν scribere constituissem, ut in ea Illustrissimum meum Principem exercerem...

(30) SARTON : *Introduction* (vol. 2, 23).

(31) Optica tribus libris comprehendimus : primo sciagraphiam, secundo radiorum reflexionem, tertio refractionem exposituri.

of book II in GIRARD's *Œuvres*). It would seem that the work was suddenly interrupted during the printing of it; according to TUNING's testimony, the printer was anxious to be through with it and became very impatient.

Book I. De sciagraphia (p. 3-85). This is what VITRUVIUS or HERO called scenographia, and corresponds more closely to modern perspective. According to STEVIN's first definition "Sciagraphia est rerum exstantium plana imitatio quae tamen eminens quoque videatur." Book II. De primis elementis catoptricae (p. 87-100). Theory of mirrors. Appendix: Discussion of virtual images on the basis of propositions of EUCLID, IBN AL-HAITHAM and WITELO. The absence of book III, which was to deal with refraction is very remarkable and the more so because the translator WILLEBRORD SNEL was destined to immortalize his name a few years later by his successful investigation of that very subject.

23. Vol. 4. Statics (*Tomus quartus de statica*, 196 p., 1605). For title-page, see fig. 16. Not available in French (except in GIRARD's *Œuvres*). STEVIN's three books on statics and hydrostatics are here reprinted but divided into five books, and supplementary materials form the substance of a sixth part. Book I. De staticae elementis (p. 3-51). Book II. De inveniendo gravitatis centro (p. 53-77). Book III. De staticae praxi (p. 79-108). Book IV. De hydrostatices elementis (p. 109-141). Book V. De initiis praxis hydrostatices (p. 143-49). Appendix statices, ubi inter alia errores quidem *Στατικῶν ἰδιωμάτων* refelluntur. Refutation of Aristotelian mechanics (p. 150-5). (Part VI). Additamentum staticae (p. 157-196). The summary announces that this supplement contains six parts, but only four were published. *(a)* De spartostatica (funium statica, statics of strings or ropes). *(b)* De trochleostatica (study of pulleys). *(c)* De fluitantibus acrobaricis (equilibrium of floating bodies, such as ships, of which the emerging part is high and heavy). *(d)* De chalinothlipsi (i.e., fremorum pressu), on the pressure of bits! The two other parts which were announced but not completed in due time and not included are *(e)*. De hydatholcia (aquae attractu). *(f)* De aërostatica (aerostatics) (32).

(32) The learned editors of MERSENNE's correspondence (Mme. P. TANNERY and CORNELIS DE WAARD) make a puzzling reference (vol. 1, 596, 1933) to "un traité spécial que STEVIN composa avant 1585 sur la pesanteur de l'air." No

24. Vol. 5. Varia (*Tomus quintus de miscellaneis*, 1608). In the preliminary announcement six parts are announced, but only the first two were actually published. Part I. De annotationibus arithmeticis (6 p.) *(a)* Discussion of a problem of DIOPHANTOS " 19 Zetema 2 libri " (33). *(b)* Latin version of the *Appendice algebraique*, for which see section 15 above. Part II. De apologistica principum ratione italica (204 p.). This is a translation of the Livre de compte de prince (section 25). The four unpublished sections would have been entitled : III. De musica theoria, IV. De architectura, V. De polemica, VI. De variis. A part of them was published by HENDRIK STEVIN.

P. 205 of vol. 5 contains a list of all the parts which had to be omitted though their publication had been announced, eight in all, i.e., the four just mentioned, one in optics, two in statics, and more arithmetical notes than the two named above (part 1 of vol. 5),—and gives an explanation of their absence : the printer's impatience; he was tired of keeping indefinitely the sheets already printed and suggested that additional materials could be published independently later when the author had completed their redaction. Table of contents of the five volumes (p. 206-10). Errata (p. 211-14).

25. (S. 143). *Livre de compte de prince à la manière d'Italie, en domaine et finance extraordinaire, estant aux Mémoires mathématiques la deuxiesme partie des meslanges, contenant ce en quoy s'est exercé... le prince d'Orange* (in all 204 p.) Leiden 1608. For title-page, see fig. 18.

Reprint from the last part of STEVIN's *Mémoires*. Originally written in Dutch it is said that there was also a separate Dutch edition but no copy of the latter has yet been found. It is probable that that separate edition was simply a reprint with separate title page of the second part of the fifth volume of the *Wisconstighe ghedachtenissen*. A revised edition of the Dutch text appeared in the *Materiae politicae* (1649). A Latin version by SNEL is included in the *Hypomnemata*. The French translation was made

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further explanation is given, nor is any source indicated, but I assume that the information is taken from ISAAC BEECKMAN's diary of which DE WAARD is preparing an edition.

(33) In reality it is problem 18 of Book II (TANNERY's edition, 1, 110-113, 1893.)

by JEAN TUNING. It was not reprinted in GIRARD's *Œuvres*.

This treatise on bookkeeping " in the Italian manner," (i.e., in partita doppia, double entry) was composed by STEVIN at the request of Prince MAURICE, and aptly dedicated to SULLY, the great French economist and minister to HENRI IV. It is divided into two parts : The merchant's account book, and the prince's account book, and the latter part is subdivided into three others : Livre de compte en domaine, livre de compte en dépenses, livre de compte en finances extraordinaires.

For another work of STEVIN's on the same subject see the note below on the *Materiae politicae*.

The earliest treatise on double-entry bookkeeping was the *De computis et scripturis* (36 chapters) included in the *Summa de arithmetica* of LUCA PACIOLI (Venice 1494) and this was the fountain head of all ulterior publications, but if PACIOLI was the first expositor of the subject he was by no means the inventor of it. It is probable that that method was invented in northern Italy. In any case the earliest examples of it have come down to us from that country : accounts of the stewards of Genoa 1340; MEDICI accountbooks, Florence 1395; ledgers of the firm DONADO SORANZO and brothers, Venice 1410. (34) These methods were perhaps somewhat different; PACIOLI said he explained the " Venetian " one.

The Italian method was introduced into the Low Countries, Germany, and England by means of a number of sixteenth century books written in Dutch, German, French, English. The bibliography of these books is full of difficulties because the authors were generally insignificant, and because the books themselves were used rather than treasured. (35) For example, the oldest English treatise on the subject, an incomplete but literal translation of PACIOLI by HUGH OLDCASTLE, was printed in London 1543, but no copy of it is extant. It was reprinted in London 1588 by JOHN MELLIS : it is MELLIS himself who tells us that OLDCASTLE's book was printed in London on August 14, 1543 and that he used it for thirty years ! These matters being of anti-

(34) For Genoa and Venice, see BROWN (1905, 99). For Florence, see ALBERTO CECCHERELLI : *I libri di mercatura della banca* MEDICI (Florence 1913).

(35) Much information may be found in BROWN (1905); also, less completely but with additional facsimiles, in GEIJSBEEK (1914).

quarian rather than of scientific interest, we may pass them over.

Suffice it to say that STEVIN was not the introducer of double entry bookkeeping into northern Europe, not by any means. On the contrary he had many obscure predecessors. His interest in the subject was natural enough for did he not begin his career as cashier and bookkeeper in Antwerp? An analysis of the sixteenth century literature on bookkeeping would show that Antwerp played an important part in the diffusion of the Italian method, as might well be expected considering her commercial supremacy in that century.

It is not even correct to say that STEVIN was the first to make a distinction between personal and impersonal (princely, municipal or national) accounts—for this had been done all along in Italy—but he emphasized the need of separating these accounts and of applying the same methods to both, and he was able to draw attention to his views in the proper places thanks to his intimate relationship with prince MAURICE and his dedication to SULLY. Apparently he was the first man to perform duties comparable to those of a public accountant and to rationalize those duties. He was keenly aware of the necessity of introducing internal checks into the accounts in order that the auditing might be easier and deeper.

The origin of his treatise is clearly explained in the dedication to SULLY and in two preliminary dialogues. He recalls his experience as a bookkeeper and cashier in an Antwerp firm and his work in the financial administration of his native city. While doing this work he was struck by the fact that the domanial and financial accounts were kept so badly that princes were always at the mercy of their intendents and receivers, who could deceive them with impunity. It was very soon clear to him that the only way to put a stop to those abuses was to introduce into the public or princely administration the very methods used by merchants, but he had no chance to set forth his views to a competent person until the day came when MAURICE OF NASSAU asked for his advice in that very matter. STEVIN explained his ideas of reform to him, and composed the first part of his work; MAURICE then asked him to compose the second part (i.e., the prince's accountbook). The Prince understood at once the

advantage of STEVIN's method and introduced it in his own domains (1604).

26. (S. 145, 146, 147, 148, 149). *Castrametatio, dat is Legermeting* (4 l., 56 p.) *Nieuwe maniere van sterctebov door spilsluysen* (2 l., 62 p.) Rotterdam 1617. For title-pages, see figs. 19-20.

These two parts are meant to go together as a single book, but they are sometimes found separate. Each has its own pagination, title page, and preface; the first preface is dated The Hague, November 4, 1617, and the second, The Hague, December 21, 1617.

The first part deals with castrametation, that is the art of laying out a military camp, with special regard to the customs and needs of the Prince of Orange. The second is devoted to the construction of sluices and the deliberate use of sluices in fortifications for defensive purposes. Sluices were useful also to maintain a proper level of water in the moats. These moats were important in peace as well as in war time for ships took refuge in them in bad weather or when the river was made unsafe by floating ice. Of course sluices had been known for centuries, but STEVIN may have improved their construction (fig. 30) and at any rate his treatise was one of the earliest on the subject, and contained the very first explanation of their use for tactical purposes, that is, for flooding the country and thus causing it to become inaccessible to the enemy. It is interesting to recall that during the great war the Belgian army availed itself near Nieuwpoort of the very method which their illustrious countryman had been the first to expound three centuries before. This treatise was much praised by general BRIALMONT.

Both parts were reprinted in the same style (i.e., with separate paginations) and with the same figures in Leiden 1633.

French translation in the same style entitled *La Castramétation* (fig. 21) ... *Nouvelle manière de fortification par écluses.* Rotterdam 1618. There is a copy of this edition in the Harvard Library. This translation was published by the same printers as the Dutch original edition and it includes the same illustrations, notably the portrait of Prince MAURICE, which is here reproduced. The translator is not named; in fact the book is not called a translation, and both prefaces are signed by SIMON STEVIN, and bear the same date, The Hague, March 12, 1618. It is possible that STEVIN made the translation himself.

There were two other French editions in the same year : one in Leiden, by the Rotterdam printer, the other in Leiden, by the ELZEVIERS,—both editions bearing the ELZEVIER imprint. The text was reprinted in GIRARD's *Œuvres mathématiques.*

There is also a German translation at least of part two : *Wasser-Baw. Erstlich in Niderländischer Sprach beschrieben... Anjetzo aber durch einen Liebhaber ins Hoch Teutsch ubersetzt.* Franckfurt, 1631.

This completes the list of the books published by STEVIN and of their later editions; we shall now consider the *Œuvres* published by GIRARD and other posthumous publications.

27. (S. 150). (Bastard title). *Les Œuvres mathématiques de* SIMON STEVIN *augmentées par* ALBERT GIRARD.

(Title page). *Les Œuvres mathématiques de* SIMON STEVIN *de Bruges où sont insérées les Mémoires mathématiques esquelles s'est exercé le... Prince* MAURICE DE NASSAU... *Le tout reveu, corrigé et augmenté par* ALBERT GIRARD, *Samielois* (36), *Mathématicien* (folio, 4 l., 224 + 680 p.) Leiden, ELZEVIER, 1634. For title-page, see fig. 22.

ALBERT GIRARD was born at Saint Mihiel, Lorraine, in 1595; he spent a good part of his life in the Netherlands and died at the Hague, 1632. (37) The *Œuvres* were thus posthumous with regard to the editor as well as to the author. The dedication to " Messeigneurs les États Généraux de Païs Bas Unis " and to " Monseigneur le Prince d'Aurenge " (38) is signed by GIRARD's widow and children. He left behind eleven children. GIRARD was himself a great mathematician, and he added many observations of his own to the Stevinian text : these observations can be easily distinguished from the rest. Some works were translated by TUNING or STEVIN, others were translated by himself and abbreviated; his own additions are always specifically mentioned as such. Hence the *Œuvres* can be used to study STEVIN's own thought, but one must be careful not to ascribe GIRARD's unmistakable interpolations to STEVIN (39).

(36) That is, of Saint Mihiel.

(37) For GIRARD's life see CORNELIS DE WAARD's article in *Nieuw Nederlandsch biografisch woordenboek* (vol. 2, 477-81, Leiden 1912).

(38) Not STEVIN's patron, MAURICE, who died in 1625, but MAURICE's younger brother, FREDERIK HENDRIK, stadhouder from 1625 to 1647.

(39) For a more detailed discussion of the differences between the STEVIN text and the STEVIN-GIRARD text see BOSMANS (1926, p. 5-9).

It will suffice to indicate briefly the contents of the *Œuvres*. They are divided into six volumes, generally bound in one; vol. 2 to 6 have a continuous pagination.

Vol. 1. Arithmétique. This includes the Appendice algebraique, p. 88-9 (see § 15). Vol. 2. Cosmographie : Doctrine des triangles (TUNING's translation in *Mémoires*, minus the tables). Geographie et Astronomie, translated by GIRARD. Vol. 3. Practique de géométrie. Books 1 to 4 are TUNING's translation, books 5-6, GIRARD's. Vol. 4. Art pondéraire ou statique. GIRARD's translation, which is not quite as faithful as SNEL's Latin version. Vol. 5. Optique. Book I was translated by TUNING, book II by GIRARD. Vols. 2 to 5 are a French translation of the *Wisconstighe ghedachtenissen*, that translation being either the one already published by TUNING in the *Mémoires mathématiques*, or GIRARD's own version. Vol. 6. Fortification. In three parts. Parts 1 and 2 are the items of § 26; part 3, GIRARD's version of the item of § 16 . There is nothing new in GIRARD's *Œuvres* except his own notes, but it is a very convenient edition of STEVIN's works, and probably the one which is used by most scholars.

28. (S. 151). *Materiae politicae. Burgherlicke stoffen. Vervanghende ghedachtenissen der oeffeninghen des... Prince van Orangie. Beschreven deur zal.* SIMON STEVIN... *En uyt sijn naghelate Hantschriften bij een ghestelt deur sijn soon* HENDRIK STEVIN (2 vols., very complicated pagin.) Leiden n.d. (1649). For title-page, see fig. 23.

After STEVIN's death his manuscripts were not handled with sufficient care by his widow and his elder son, FREDERIK (1613-39). When his second son, HENDRIK inherited them he found them in great disorder. Some of them had found their way into other hands, for example, in those of ISAAC BEECKMAN (1588-1637) (40), who had made copies of them. HENDRIK obtained these copies (or the originals?) through ISAAC's brother, ABRAHAM. He tried to put all these papers in order and began a publication of them in 1649. Only these two volumes have appeared. Their dedication is dated Alphen, February 1649. As the *Materiae politicae*

(40) On ISAAC and ABRAHAM BEECKMAN, see notes by CORNELIS DE WAARD : *Nieuw Nederlandsch biografisch woordenboek* (vol. 7, 84-88, 1927).

do not contain much which would be of direct interest to the historian of science, my description will be very brief. All these writings are in Dutch, but for the sake of simplification I shall not quote the Dutch titles except in one case.

Vol. 1 contains a series of eight memoirs on administrative and military matters. 1. Description of a model town and a model house (128 p.) 2. New edition of the *Vita politica*, 1590 with the appendix included in the Middelburg edition of 1658 (p. 1-45). 3. Organization and hierarchy of different administrative bodies and authorities (p. 47-86). 4. Administrative ethics; means of selecting good officials (p. 87-121). 5. Rules for diplomatic correspondence and records (p. 123-41). 6. Retaliations in peace time (p. 143-52). 7. Necessity of moving garrisons frequently, and the keeping of adequate records to facilitate periodical movements of that kind (p. 153-73). 8. Non-mathematical parts of the military art (p. 175-273).

Vol. 2. Sometimes found separately with the title *Verrechting van domeine mette contrerolle en ander behouften vandien*. Leiden, " In 't tweede Iaer des Vredes " (In the second year of the peace (41), i.e., 1649). This contains only two items, both dealing with financial matters. The first is the *Verrechting van domeine*. Reform of the domanial administration (4 l., 156 p.). The second, *Vorstelicke bouckhouding in domeine en finance extraordinaire op de italiaensche wyse* (complicated pag., total 274 p.) This second part is a revised and enlarged edition of the Dutch version of the *Livre de compte de prince* in the *Wisconstighe ghedachtenissen*.

Parts of this vol. 2 have been reproduced in facsimile in GEIJSBEEK (1914, 114-36).

Another " title " edition of the *Materiae politicae* was published by the same printers, but by another publisher in Leiden 1649 (S. 152). A real second edition appeared in The Hague 1686.

29. (S. 153). HENDRIC STEVIN : *Wisconstich filosofisch bedryf* (one vol. quarto, very complic. pagin.) Leiden 1667 (fig. 24). *Plaetboec* (folio atlas accompanying the vol. of text) Leiden 1668.

The author of this work is not SIMON, but his son HENDRIK.

(41) Reference to the Treaty of Münster (Jan. 1648) between Holland and Spain, wherein the latter finally recognized the independence of the United Provinces.

However, the latter refers frequently to the former and quotes fragments from his unpublished writings, e.g., on the construction of windmills, (42), on the keeping in repair of harbors and waterways, on the impossibility of perpetual motion.

I have not seen this work and only know it through the description given in the *Bibliotheca belgica*, wherein the Dutch titles of each part are given. However, these titles are not always sufficiently clear to warrant translation without the context. Brief and incomplete as my analysis is, it will suffice to indicate the nature of this collection.

1. Explanation of the publication of this work, including biographical information. 2. Resistance of solid bodies, such as cords, beams, columns, axles. 3. Statics. 4. Cinematics. Includes an exchange of letters (1618) between SIMON STEVIN and I. L. HOSTE, mathematician to the Duke of Lorraine: HOSTE thought he had found a means of creating a perpetual motion, and STEVIN proves that he is wrong. 5. Van de schampige beweging. 6. Van alder volmaecste cammen en staven (on the best materials for the construction of windmills). 7. Van rechtschape reetschap van gewelt. 8. Vant onfeylbaer uyrwerk te water en te land (on an infallible clock for use on land or at sea). 9. On an unsinkable ship. 10. On windmills. This seems to be SIMON's own work; in any case it refers to his own inventions patented in 1586 or 1588. Another treatise on windmills by SIMON as preserved by A. BEECKMAN. 11. Documents and remarks concerning the works to be undertaken in various cities to improve their harbors and waterways. Much of this concerns SIMON directly. The cities involved are Danzig, Elbing, Braunsberch, Deventer, Rheinberg, Schiedam, Lingen, Calais, Leiden. 12. More hydraulic projects. This includes two chapters by SIMON on pumps. Some of HENDRIK's schemes were very bold (see prop. 25); he suggested drying up the sea of Haarlem, building a dam in the Ij and draining part of it, digging a canal from Amsterdam to the North Sea, draining the Zuiderzee. Some of these projects have actually been realized, the last one is in the process of realization in our own days. 13. Theological and philosophical

(42) They are called " watermolens " (watermills) but they are really windmills used for pumping water. The Dutch term refers to their function, the English to the driving power.

topics. 14. Van de wisconstige burger en crychvolcstier. 15. Appendix, containing various corrections.

30. *De spiegeling der singconst* (Mirror of the art of singing). Edited by DAVID BIERENS DE HAAN (1822-95), in the latter's Bouwstoffen voor de geschiedenis der wis- en natuurkundige wetenschappen in de Nederlanden, no. XXVI (*Verslagen en mededeelingen der koninklijke Akademie, Afd. Natuurkunde*, 20, 102-95, Amsterdam, 1884).

This is the treatise on music which STEVIN had planned to publish in vol. 5 of his *Wisconstighe ghedachtenissen* (see § 24). In fact it is entitled " Derde deel der ghemengde stoffen vande spiegeling der singconst " (third part of the miscellanea, etc.).

31. *Van de molens* (about windmills). Edited by the same in same series no. XXVII (*Ibidem*, 197-232).

This treatise by SIMON STEVIN was revised by one Professor GOLIUS in 1634. Calculations concerning 19 windmills.

Both items 30 and 31 have also been reprinted by BIERENS DE HAAN in a separate volume. SIMON STEVIN : *Deux traités inédits* (Amsterdam 1884), wherein he has replaced his Dutch prefaces of the original academic edition by French prefaces.

32. *Unpublished manuscripts*. For information on the STEVIN's MSS. see *Bibliotheca belgica*, note S. 151, p. 8-15 and the end of BOSMANS' notice in the *Biographie nationale de Belgique* (1924). Some of STEVIN's texts will eventually be published in BEECKMAN's Diary to be edited by CORNELIS DE WAARD. However, it would seem that the essential of SIMON STEVIN's abundant production is already available in print. In fact the very best was already available in STEVIN's time, and the posthumous publications which we owe to the piety of his son and of BIERENS DE HAAN have added but little to his fame.

III. — STEVIN'S ACHIEVEMENTS

His mathematical sources

33. Before dealing with STEVIN's mathematical discoveries, it is well to say a few words of his mathematical learning. We may assume that he was tolerably well acquainted with the Greek masterpieces available in Latin. He knew especially well EUCLID and DIOPHANTOS. Among the Arabic mathematicians, he knew

AL-KHWĀRIZMĪ, as translated by ROBERT OF CHESTER. He was familiar with the writings of his older contemporaries the Italians CARDANO, TARTAGLIA and BOMBELLI, and the Portuguese PEDRO NUÑEZ, but apparently not with those of the German mathematicians except MICHAEL STIFEL and perhaps CHRISTOFF RUDOLFF. (43)

Arithmetic

34. First systematic explanation of decimal fractions and extension to them of the fundamental operations (1585). (44) Unfortunately the beauty of this innovation was hidden by cumbersome notations.

First suggestion of the extension of the decimal idea to weights and measures (1585).

These two very important items will be fully discussed in a separate paper.

35. Publication of the earliest printed tables of interest (1582).

36. Insistence on the separation of princely or government accounts from the personal ones and application of the Italian methods, i.e., double-entry bookkeeping, to both (1608). STEVIN was not the first to do this (45), but he worked out these ideas in great detail and recommended their adoption to Prince MAURICE and to HENRI IV's minister, SULLY.

Algebra

37. Rules relative to equations can be generalized if signs are attached to the numbers: e.g., one can then speak of adding $(-b)$ to a instead of subtracting b from a. They can be generalized as well if one admits that some coefficients may be null (incomplete equations).

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(43) FLORIAN CAJORI: *History of mathematical notations* (vol. 1, 157, 1928).

(44) These dates refer to STEVIN's publications which can be easily identified by reference to the list given above. In 1585, and also in 1594 he published more than one book but on such different subjects that no ambiguity is possible. For subjects dealt with in the *Hypomnemata* the date is sometimes given as 1605, sometimes 1608 (see note in section 19).

(45) Not to speak of the Byzantine financial administration which was highly technical, sound ideas on state accounts and budgets had been developed by Oriental authors many centuries before STEVIN. See for example the *Siyāsat-nāma* composed in Persian by NIẒĀM AL-MULK in 1092. Extract translated into French by CARRA DE VAUX: *Les penseurs de l'Islam* (vol. 1, 314-5, 1921). SARTON: *Introduction* (vol. 1, 780).

That the addition of $(-b)$ is the same as the subtraction of b had already been stated by STIFEL (*Arithmetica integra* 1544) and CARDANO (*Ars magna* 1545), but STEVIN was the first to make use of this for the generalization of the solution of equations.

On that basis STEVIN generalizes the rules relative to the solution of quadratic, cubic, and biquadratic equations. However, the cubic equation must first be reduced to the form $x^3 = px + q$.

The treatment of equations must be purely algebraical, i.e., free from geometrical considerations. (1585).

38. Interpretation of negative roots of equations as the positive roots of the equation obtained by the substitution of $(-x)$ for x. Hence every equation of the second degree whose roots are real, has two roots (1585).

That interpretation was already expressed by CARDANO with respect to cubic equations (*Ars magna*, 1545). For STEVIN's views see GIRARD's edition, p. 77.

39. Rule for the solution of numerical equations of any degree. (46) Given the equation $f(x) = 0$, if $f(a) > 0$ and $f(b) < 0$, there is at least one root between a and b.

STEVIN shows how the decimals of the root can be obtained by successive approximations, and he remarks that in some cases the true value cannot be reached though one can obtain as many decimals of it as one may wish and come indefinitely near to it (1594).

40. Modern definition of polynomials (*Arithmétique*, book 1, def. 26). Solution of the problem : to find the greatest common divisor of two polynomials (ibidem, book II, problem 53) (1585).

Geometry

41. Generation of an ellipse by lengthening the ordinates of a circle in the same proportion (1605).

Scénographie, article VI (GIRARD, p. 549).

42. Solution of particular cases of the inverse problem of perspective : Given two figures in a plane which are perspectives of one another, place them in space and determine the eye's position (1605).

Scénographie, Invention de l'œil (GIRARD, 550, etc.) See MICHEL CHASLES : *Aperçu historique* (Bruxelles, 1837, 347).

(46) Needless to say no equations are meant other than rational and integral polynomials equalled to zero.

If the perspective (or picture) plane rotates around the ground line and the spectator rotates around his basis, remaining all the time parallel to the plane, the perspective will not be disturbed; it will still exist when the perspective plane is horizontal (1605).

Scénographie, Theor. V, Prop. VII (GIRARD, p. 533). GINO LORIA : *Storia della geometria descrittiva* (Milano 1921, 21, 215).

Trigonometry

43. Reduction of the trigonometrical formulas relative to right-angled spherical triangles to six, and an explicit statement that these six formulas are sufficient to solve all problems (1608).

A. v. BRAUNMÜHL : *Vorlesungen über die Geschichte der Trigonometrie* (vol. 1, 227, 1900).

Analysis

44. The method of exhaustion as applied by ARCHIMEDES, involving a *reductio ad absurdum*, is replaced by a direct passage to the limit, e.g., in the determination of centers of gravity (1586).

Thus STEVIN is one of the links in the gradual transformation of the Greek method of infinitesimal analysis into the modern one, the chain being as follows : ARCHIMEDES, COMMANDINO, STEVIN, GRÉGOIRE DE SAINT VINCENT, GUILLAUME BOELMANS, ANDRÉ TACQUET, PASCAL, LEIBNIZ. Another chain was ARCHIMEDES, LUCA VALERIO, KEPLER, CAVALIERI, LEIBNIZ. These chains were not independent for there were contacts between VALERIO and SAINT VINCENT, and perhaps between STEVIN and KEPLER.

STEVIN's *mechanical sources*

45. STEVIN was acquainted with the *Μηχανικὰ προβλήματα* ascribed to ARISTOTLE; with ARCHIMEDES, PAPPOS; JORDANUS NEMORARIUS—the *Liber* JORDANIS *de ratione ponderis* was printed in Venice 1565 (47); LEONARDO DA VINCI (via CARDANO), and TARTAGLIA. He was probably acquainted with GIAMBATTISTA BENEDETTI's early work through JEAN TAISNIER, but it is unlikely that he knew already in 1586 BENEDETTI's main work, the *Diversarum speculationum mathematicarum et physicarum liber* (1585) wherein

(47) SARTON : *Introduction* (2, 615).

some of his hydrostatic ideas were anticipated : a year is but a very short time for a work printed in Torino to reach the Low Countries in the midst of war. He may have known the *Mechanicorum liber* of GUIDO UBALDO DEL MONTE (Pisauri 1577).

Statics

46. Simple demonstration (different from the Archimedean) of the condition of equilibrium of a horizontal lever with unequal arms (1586). It is true this demonstration had been known implicitly (48) for a considerable time,—perhaps already in Hellenistic days. A similar demonstration reappears in GALILEO's *Discorsi e dimostrazioni* (1638), and in later writings.

It should be noted that STEVIN's demonstration is not essentially better than that of ARCHIMEDES, for he makes use of the center of gravity, the determination of which implies the principle of statical moment. However, his attempt to improve the epistemological foundation of statics is significant. (49)

47. Very simple and original demonstration of the law of equilibrium on an inclined plane based upon the postulate of the impossibility of perpetual motion (1586).

Hence are implicitly deduced : the general law of composition of concurring forces (parallelogram of forces), the decomposition of a single force (e.g., the weight of a body) into two normal components (see also *Spartostatica*, 1605).

48. STEVIN did not actually recognize the principle of virtual velocities, already vaguely expressed in the Peripatetician physics and developed during the Middle Ages by Muslim and Christian mechanicians, but he accepted a principle somewhat differently represented by these two Latin lines.

Ut spatium agentis, ad spatium patientis :
Sic potentia patientis, ad potentiam agentis (50).

These two principles were often confused in the sixteenth century but STEVIN was very clearly in favor of virtual displacements

(48) It is found explicitly in a thirteenth century MS. (Bibl. Nat. Paris, fonds latin, 7377B) quoted by DUHEM (1905, 1, 287-9).

(49) For another criticism of ARCHIMEDES see V. F. LENZEN : ARCHIMEDES' theory of the lever (*Isis*, 17, 288-89, 1932).

(50) Quoted in his *Trochleostatica* (1605, p. 172) and called by him a " staticum axioma."

as against virtual velocities; in this he was followed by DESCARTES. On the contrary GALILEO continued in this respect the Peripatetician line of thought.

49. Representation of forces by vectors. (Was STEVIN truly the first to do this?).

Hydrostatics

50. Restatement of the fundamental principle of hydrostatic equilibrium—" Aquam datam, datum sibi intra aquam locum servare " (51)—established upon the postulate of the impossibility of perpetual motion.

Hence are deduced the laws of hydrostatic pressure and their application to the study of communicating vessels and floating bodies and finally the hydrostatic paradox (1586).

Similar conclusions with regard to communicating vessels and even to the principle of the hydraulic press were published a year earlier by GIAMBATTISTA BENEDETTI in a letter " De macina quae aquam impellit et sublevat " included in his *Diversarum speculationum mathematicarum et physicarum liber* (Torino 1585, 287-8) but STEVIN's work was in all probability independent of this. (52)

51. There has been some discussion as to whether STEVIN was the discoverer of the hydrostatic paradox or not. It has been claimed, on the one hand, that it was already implied by ARCHIMEDES, who discovered the general law of which the hydrostatic paradox was but a paradoxical consequence; on the other hand (by SCHOR) that for a clear recognition of it we must wait until PASCAL (*Traitez de l'équilibre des liqueurs*, Paris 1663). I believe that both claims are wrong : one cannot give credit to anybody for implications, but only for explicit statements, especially not when the implication is somewhat paradoxical. On the other hand though STEVIN did not understand the paradox as deeply as PASCAL, nor express it as neatly (as far as expression is concerned STEVIN was but a stammerer as compared with PASCAL),—yet

(51) I quote the Latin translation from the *Hypomnemata* (vol. 4, 114). The original text was in Flemish (1586).

(52) The most elaborate study on BENEDETTI is GIOVANNI BORDIGA : GIOVANNI BATTISTA BENEDETTI, filosofo e matematico veneziano del secolo XVI (*Atti del R. Istituto Veneto*, t. 85, p. 2da, 585-754, 1926; see p. 718).

he was clearly aware of it and suggested experimental verifications of it.

An excellent vindication of STEVIN was made by no less a person than LAGRANGE in his *Méchanique analitique* (Paris 1788, première partie, section 6) (53).

Let us read STEVIN. I cannot refer to the Dutch text of 1586 which is not available to me, but see *Hypomnemata*, t. IV, p. 119.

" 8 Theorema 10 Propositio. Aquae fundo horizonti parallelo tantum insidet pondus quantum est aquae columnae cujus basis fundo, altitudo perpendiculari ab aquae superficie summa ad imam demissae aequalis sit."

Then see *Hypomnemata*, t. IV, p. 145.

" Exemplis pragmaticis 10 propositionis hydrostatices veritatem comprobare." In this place there is a good statement of the hydrostatic paradox, and of the experimental verification of it, and the application of it which led later to the hydraulic press (54) is unmistakably indicated. For the French translation of these texts see the *Œuvres mathématiques* edited by GIRARD (vol. 2, 487, 498).

STEVIN's priority over PASCAL with regard to the hydrostatic paradox is also established by the testimony of contemporaries : see the memorandum prepared by DESCARTES for ISAAC BEECKMAN in 1618 and preserved in the latter's diary and MERSENNE's remarks in his *Vérité des sciences* (Paris 1625, p. 231) concluding that under certain circumstances " un sceau d'eau peut autant peser comme fait toute l'eau de la mer " (55).

52. Approach to the notion of metacentrum in his treatise on topheavy floating bodies (De fluitantibus acrobaricis) added to the second edition of the Statics (*Hypomnemata*, vol. 4, 177-80, 1605). See our fig. 29.

(53) *Œuvres de* LAGRANGE (vol. XI, 191-2, 1888). According to DUHEM, STEVIN deserves even more credit than LAGRANGE was willing to give him; he should be considered " the inventor of the true foundations of hydrostatics." P. DUHEM : ARCHIMEDE connaissait-il le paradoxe hydrostatique ? (*Bibliotheca mathematica*, 1, 15-19, 1900). D. SCHOR : STEVIN und das hydrostatische Paradoxon (*Ibidem*, 3, 198-203, 1902).

(54) Or " Bramah " press, patented by JOSEPH BRAMAH (1748-1814) in 1795.

(55) For DESCARTES, see *Œuvres* (ADAM et TANNERY, vol. 10, 67-74, 1908). For MERSENNE, his *Correspondance publiée par Mme.* PAUL TANNERY (vol. 1, 313, 1933). MERSENNE quotes STEVIN, DESCARTES does not, but the source of his reflexions was undoubtedly the same.

The metacentrum was first defined and named by PIERRE BOUGUER (1698-1758) in his *Traité du navire, de sa construction et de ses mouvemens* (Paris, 1746, 257).

Navigation

53. Scientific comparison of the two fundamental methods of navigation : sailing along a great circle and sailing along a loxodrome (56) (De histiodromia, 1608).

The history of the loxodromes (curves cutting all the meridians under the same angle) begins with PEDRO NUÑEZ, who was the first to have a clear idea of them and to show that they were spirals coiling round but never reaching the poles (1537). NUÑEZ was not able to draw correctly a loxodrome on a map, and there is no Portuguese map with correct loxodromes anterior to MERCATOR. The latter's globe of 1541 was the first correct application of them to cartography. (57)

The use of the MERCATOR projection made the drawing of loxodromes very easy, as these were projected as straight lines. The earliest known example of the MERCATOR projection is MERCATOR's planisphere of 1568-69, but it was only approximately correct up to the latitude of 40°. The construction was empirical : MERCATOR probably noted where the loxodromes cut the meridians on a sphere and placed his parallels on the map accordingly. The first attempt to solve the problem mathematically (as much as this could be done without the resources of the calculus) was made by EDWARD WRIGHT (1558?-1615) : WRIGHT's principles were applied with acknowledgment by THOMAS BLUNDEVILLE in London 1594 and without acknowledgment by JODOCUS HONDIUS in Amsterdam, c. 1597; WRIGHT finally published them together with tables ad hoc in his *Certaine errors in navigation* (London 1599) (58).

The loxodrome was at first called linea rhombica, rumbus, rhumb or rhumb line. CANTOR says that the word loxodrome

(56) S. GÜNTHER (1879, 345, 363, 395).

(57) HERMANN WAGNER : Die loxodromische Kurve bei MERCATOR (*Nachrichten, Kgl. Ges. d. Wiss., Göttingen*, 254-67, 1917; *Isis*, 4, 591).

(58) M. BLUNDEUILLE *his Exercises containing sixe treatises* (London 1594). JODOCUS HONDIUS' map called *Typus totius orbis terrarum* (c. 1597). MOTTELAY (1922, 559-64).

was introduced by WILLEBRORD SNEL in his *Tiphys Batavus* of 1624 (59). This statement is not correct. We find that word already in STEVIN's treatise on the Histiodromia (1605),—but the Latin translator of that treatise was SNEL himself. Hence SNEL may have been the introducer, instead of STEVIN (I have no access to the Dutch text), but in any case he introduced them in STEVIN's work, and the date is 1605, not 1624. The word loxodrome is opposed to the word orthodrome, referring to a great circle.

" Histiodromiae subjectum quatuor definitionibus et undecim propositionibus expedivimus, earum duae priores *ὀρθοδρομίαν* seu rectas velificationis lineas, caeterae *λοξοδρομίαν* seu curvas explicabunt " (*Hypomnemata*, vol. 1, part. 2, 84, 1605).

This treatise includes " canones loxodromici " enabling the navigator to construct loxodromes point by point on a globe. These tables were an improvement upon the tables of meridional parts compiled by EDWARD WRIGHT (who is duly named in the introductory statement,) and they were considerably elaborated by SNEL in his *Tiphys Batavus* of 1624.

STEVIN suggested the use of metallic " curves " (curved rulers) for the drawing of loxodromes on a sphere. (De loxodromicarum cuprearum helicum fabrica. *Ibidem*, p. 138).

54. Method of identifying harbors by the determination—in addition to the latitude—of magnetic declination, the direction of the true north being found by the observation of two equal altitudes of the sun (1599).

According to STEVIN's own statement credit for this method should be given in the first place to the geographer PETRUS PLANCIUS (see above section 17); in any case PLANCIUS it was he who obtained the data collected in *De Havenvinding*. STEVIN quotes in the same book (1599) one REGNIER PIETERSZOON (REGINALDUS PETRAEI) as the inventor of a special model of quadrant, but he makes no reference to anybody else, not even to WILLIAM BOROUGH (1536-99) English navigator who appended to the *Newe Attractive* by ROBERT NORMAN (London 1581) a " *Discourse of the variation of the cumpas, or magneticall needle, wherein is mathematically*

(59) *Tiphys batavus sive histiodromice, de navium cursibus et re navali* (Leiden 1624). CANTOR: *Vorlesungen* (II2, 707, 1900).

shewed the manner of the observation, effects, and application thereof." BOROUGH gave many observations of variation and remarked that nearly all the contemporary charts including MERCATOR's famous planisphere of 1569, were full of errors because the cartographers had failed to take variation into account. The *Discourse* was reprinted at least three times : 1585, 1596, 1611, 1614 (?). Thus three editions appeared before the *Havenvinding*. However, it is possible that STEVIN had not heard of it.

Theory of tides

55. General theory of tides in the sixth book of the geography : De theoria maritimorum aestuum in accessu et recessu (*Hypomnemata*, vol. 1, part II, p. 175-188, 1608.)

STEVIN and later KEPLER expressed their belief in the importance of lunar attraction as a tidal factor. STEVIN tried to develop a mathematical theory of this; he was more cautious in his conclusions than KEPLER. The latter's belief in the magnetic influence of the moon was an object of derision to GALILEO whose fear of astrological explanations led him to deny the possibility of any lunar influence on the tides. STEVIN's and KEPLER's theories, imperfect as they are, constitute the most important progress in the theory of tides before NEWTON's *Principia*.

STEVIN indicates a rough means of calculating the beginning of ebb and flow from lunar observations. At the end of his book (Prop. 9. Quomodo aestuum maritimorum cognitio planius indigari possit) he insists upon the necessity of obtaining abundant experimental data in order to be able to improve the mathematical theory of tides and their prediction in definite places. He also suggests (*ibidem*) making an experimental study of tides in a small and remote island, such as St. Helena, where the general phenomena would not be disturbed by continental influences.

Geology

56. The second book of STEVIN's geography printed in the *Hypomnemata* (vol. 1, part II, p. 47-67, 1605) entitled " De hylocinesi terrestris globi " is truly a geological treatise. According to the first definition (p. 51) " Terreni globi hylocinesis, est variarum materiarum, è quibus coagmentatus est, motus in suo loco, figura totius manente sphaerica."

In plain English the term " hylocinesis " refers to the internal changes of the materials constituting the earth. STEVIN's treatise is a summary of physical geology discussing the changes in the surface of the earth and the forces which produce them.

His views might be roughly described as uniformism (as opposed to catastrophism) : he explains past changes by the action of forces which we may observe with our own eyes. His account of the formation of mountains is incorrect because he had but little if any knowledge of them; he was very familiar with dunes and was deceived by a false analogy between dunes and mountains. He gives accounts of many physical actions which modify the face of the earth : wind, rain, snow, running waters, evaporation, alluvions, sedimentations (and how these are affected by the varying speed of a stream), water infiltrations, incrustations, petrifications. He had noted the difference in the profiles of the two banks of a river, and the gradual development of its meanders; the alternations of lands and sea; he makes curious remarks on the dissolution of all kinds of earths and minerals in water, on the destruction and " growth " of rocks and metals, etc. Correct interpretation of fossil shells. His explanation of peat deposits is incorrect.

Similar ideas are found in the Arabic and Latin writings of the Middle Ages. (60) A more detailed inventory of them than has yet been attempted would be needed to determine exactly the amount of novelty of STEVIN's views. According to ZITTEL (61), STEVIN's book was the first systematic treatment of the subject, but such a statement remains doubtful and meaningless, until a comparative analysis has been made of that book and of various mediaeval summaries.

Technology

57. Improvements in the construction and use of sluices (canal locks) and application of sluices to the defense of fortified places (1617). See my preliminary discussion of this in my account of STEVIN's *Castrametatio* in § 26 (Fig. 30).

Sluices were possibly invented as early as the time of PTOLEMAIOS II (middle of the third century B.C.), and we may

(60) SARTON : *Introduction* (vol. 2, 48).
(61) ZITTEL (1901, 186).

expect their development to have been especially rapid in countries such as Holland, where the need of them was greatest. According to DARMSTAEDTER and FELDHAUS (62) a sluice with gates at both ends (lockchamber, Kammerschleuse, kolksluis) was built in Spaarndam, 1253, by WILLEM OF HOLLAND (This would then be WILLEM II, count of Holland and Zeeland, born 1228). The existence of such a sluice in Holland by the middle of the thirteenth century is plausible; yet I have found no documents confirming it. We have more definite evidence concerning the locks constructed in 1439 by FIORAVANTE OF BOLOGNA and FILIPPO DEGLI ORGANI of Modena. (63) The first clear description of locks was given by LEONE BATTISTA ALBERTI (1404-72) and excellent drawings were made sometime later by LEONARDO DA VINCI.

To return to STEVIN, we find the following information in his treatise of 1617 (I have used the French translation of 1618 published by himself and presumably equivalent to the Dutch original). It is divided into four chapters :

1. De la nouvelle invention d'escluses; 2. De l'affermissement des fonds d'escluses et dodanes; 3. Règle générale de la nouvelle manière de la fortification des villes par escluses; 4. Exemples comment aucunes villes consistantes en effect, se peuvent fortifier par les règles générales du 3 chapitre.

STEVIN's improvements were relative to three purposes : the deepening of harbors, the drying up of low lands, and the transfer of ships with high masts. Smaller improvements concern the construction of foundations, and gates and other technical details. However, the main novelty of his effort consists in its application to fortification.

58. STEVIN improved the windmills which were so extensively used in his country for pumping water out of the polders. In 1586, he received a patent concerning their construction from the States-General. I do not know the exact nature of the improvements which he introduced.

59. He invented a kind of chariot equipped with sails, by means of which a party of 28 people including Prince MAURICE were taken from Scheveningen to Petten along the shore of the

(62) LUDWIG DARMSTAEDTER's *Handbuch* (Berlin 1908). F. M. FELDHAUS : *Die Technik* (Leipzig, 1914, 962).

(63) I shall discuss this in vol. 4 of my *Introduction to the history of science.*

North Sea in two hours, the distance being fourteen Dutch miles (a distance of more than fourteen " hours "); this occurred probably about the end of the year 1600.

This unimportant invention seems to have given him more popularity with his contemporaries than all the rest of his work! It is known through an engraving by JACQUES DE GHEYN representing the chariot (plate 3, fig. 27), with a text in Dutch, French, and Latin, and a poem by HUGO GROTIUS celebrating it. These engravings were first published c. 1612, and many times published and imitated afterwards. A complete set is exceedingly rare. I have never seen them and know them through a description in F. MULLER: *De Nederlandsche geschiedenis in platen. Beredeneerde beschrijving van Nederlandsche historieplaten* enz. (vol. 1, 139-41, Amsterdam 1863-70) and through photostats of a late copy in the British Museum. The title of the copy described by MULLER is " Currus veliferi illustrissimi principis Mauritii volitantes duabus horis Scheverina Pettenum ad quatuordecim milliaria hollandica, quae singula justae horae iter excedunt." (Abbreviated on our fig. 27).

The British Museum copy, dated Amsterdam 1652, is oblong, the three pages of the French text being printed side by side; the three pages of the Dutch side on another sheet, and the two pages of the Latin text on still another. Considering the great rarity of that publication and its relative shortness I reproduce in appendix the French text, entitled " Les artificiels chariots à voiles du comte Maurice." (fig. 25). The Latin text is entitled " Comitis Mauritii Currus artificiales vento acti " (fig. 26) and the Dutch text " Sijn Excell. Graef Maurits kunst-rijcke Windtwagens."

The text which may be read in extenso in its French form below, is curious from the point of view of popular psychology, but its technical interest is negligible. Obviously the man who wrote it was neither technically minded nor intelligent.

To return to STEVIN's sailchariot, it was used again in 1606 by the French savant NICOLAS CLAUDE FABRI DE PEIRESC (1580-1637), who admired it exceedingly. According to JACQUES DE GHEYN's illustration there was also a smaller chariot; the latter was tried as late as 1790, the experiment being unsuccessful, and it could still be examined in Scheveningen in 1802.

See our plate 4, fig. 28 for a view of the chassis of STEVIN's chariot.

60. It is not correct to say as is done in DARMSTTAEDER's *Handbuch* (64) (1908, under year 1605) that STEVIN was the first to illustrate surveying chains. These were first described and illustrated by MELCHIOR SEBIZ : *Siben Bücher von dem Feldbau* (Strassburg 1579, p. 472).

FRANZ M. FELDHAUS : Zur Geschichte der Messkette (*Geschichtsbl. für Technik und Industrie*, vol. 6, 71-72, 1 fig., Berlin 1919).

61. To conclude, STEVIN's main achievements concern the extension of the decimal idea to fractions, and to weights and measures, the theory of algebraic equations, and above all the principles of statics and hydrostatics. He was one of the greatest mathematicians of the sixteenth century and the greatest mechanician of the long period extending from ARCHIMEDES to GALILEO.

IV. — BIBLIOGRAPHY

62. This bibliography is by no means complete, but it contains the essential. For the earlier writings see the *Bibliotheca belgica* (vol. 23, Ghent 1880-90), Father BOSMANS' notice in the *Biographie nationale* (Brussels 1924) or W. VAN DER WOUDE's notice in the *Nieuw Nederlandsch biografisch woordenboek* (Leiden 1921). General reference books such as CANTOR, DARMSTAEDTER, TROPFKE, SARTON are not quoted. There are a few additional references in the footnotes. See also the bibliography included in my second STEVIN paper (section 115).

ALMAGIÀ, ROBERTO : La dottrina della marea nell'antichità classica e nel medio evo (*Acc. dei Lincei, Memorie, sci. fis.*, vol. 5, 377-513, see p. 510. Roma 1905).

BOSMANS, HENRI : Notes sur l'arithmétique de S.S. (*Ann. soc. scient.*, 35, mém. 293-313, Bruxelles, 1911).

— Sur quelques exemples de la méthode des limites chez S.S. (*Ann. soc. scient.*, 37, mém. 171-99, 1913).

(64) The dates concerning STEVIN in that *Handbuch* are generally incorrect.

— La Thiende de S.S. A propos d'un exemplaire de l'édition originale qui a échappé à l'incendie de Louvain (*Rev. quest. scient.*, 27, 109-139, Bruxelles, 1920; *Isis*, 4, 142).

— Remarques sur l'arithmétique de S.S. (*Mathesis*, 36, 23 p., 1922; *Isis*, 5, 223).

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(65) Father Bosmans has written many other papers which ought to be considered though they do not deal specifically with S.S. See A. Rome : Le R. P. Henri Bosmans, S.J. (*Isis*, 12, 88-112, 1929).

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In Russian. See *Isis*, 15, 295.

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Iconography

63. Description of the illustrations of this paper. For the indication of sources, I use the following abbreviations :

BM British Museum, London.
BRB Bibliothèque Royale de Belgique, Brussels.
HCO Harvard College Observatory, Cambridge, Mass.
HL Henry E. Huntington Library, San Marino, California.
HUL Harvard University Library, Cambridge, Mass.
LUG Library University of Ghent.
LUL Library University of Leiden.
MPM Museum Plantin-Moretus, Antwerp.

The courtesy of these eight libraries is duly appreciated. I owe special thanks to Dr. ALBERT TIBERGHIEN of Brussels, Drs. L. E. BLISS and R. O. SCHAD of San Marino, Prof. PAUL BERGMANS of Ghent, Dr. MAURITS SABBE of Antwerp and Dr. V. SCHOLDERER of London.

Plate 1, fig. 1. STEVIN's early portrait by an unknown painter (LUL). This portrait is mentioned by E. W. MOES in his *Iconographia batava* (vol. 2, no. 7584, 1905) but no information is given. Nor could any additional information be provided by the Rijksbureau voor kunsthistorische en ikonografische documentatie in The Hague. I thank Mr. L. VAN BLOMMESTEIN for his courteous reply of May 4, 1933.

Plate 2, fig. 2. Portrait of MAURICE, prince of Orange, count of Nassau. Taken from the French *Castrametation*, 1618 (HUL), but the same portrait occurs in the original Dutch edition of the same book, 1617 (not available to me) the same block being presumably used for both editions.

Fig. 3. *Tafelen van interest.* Antwerp 1582 (BRB). See § 8.

Fig. 4. *Problemata geometrica.* Antwerp (1583). See § 9 (BRB).

Fig. 5. *Dialectike ofte Bevvysconst*, Leiden 1585. (MPM). See § 10.

Fig. 6. *De beghinselen der weeghconst.* Leiden 1586 (BRB). See § 13.

Fig. 7. *De weeghdaet.* Leiden 1586 (BRB). See § 13.

Fig. 8. *De beghinselen des waterwichts.* Leiden 1586 (BRB). See § 13.

Fig. 9. *Vita politica. Het burgherlick leven.* Leiden 1590 (BRB). See § 14.

Fig. 10. *De sterctenbovwing.* Leiden 1594 (BRB). See § 16.

Fig. 11. *De havenvinding.* Leiden 1599 (HCO, after HELLMANN). See § 17.

Fig. 12. *The havenfinding art.* London 1599 (HL). See § 17.

Fig. 13. *Wisconstige gedachtenissen.* Leiden 1608 (BRB). See § 18-24.

Fig. 14. *Tweede stuck der wisconstighe ghedachtnissen.* Leiden 1605 (BRB). See § 18-24.

Note that the words "*wisconstige gedachtenissen*" are spelled differently in vol. 1 and vol. 2, and that the dates of these volumes according to the original titlepages are respectively 1608 and 1605. See § 19.

Fig. 15. *Hypomnemata mathematica.* Leiden 1608 (HUL). See § 18-24.

Fig. 16. *Tomus quartus mathematicorum hypomnematum.* Leiden 1605 (HUL). See § 13, 18, 19, 23.

Fig. 17. *Mémoires mathématiques.* Leiden 1608 (HUL). See § 18-19.

Fig. 18. *Livre de compte de prince à la manière d'Italie.* Leiden 1608 (BRB). See § 25.

Fig. 19. *Castrametatio, dat is legermeting.* Rotterdam 1617 (BRB). See § 26.

Fig. 20. *Nievwe maniere van sterctebov door spilsluysen.* Rotterdam 1617 (LUG). See § 26.

Fig. 21. *La castrametation.* Leiden 1618 (HUL). See § 26.

Fig. 22. *Les œuvres mathématiques de* S. STEVIN, edited by ALBERT GIRARD. Leiden 1634 (HUL). See § 27.

Fig. 23. *Materiae politicae. Burgherlicke stoffen*, edited by H. STEVIN. Leiden (1649) (BRB). See § 28.

Fig. 24. HENDRIC STEVIN: *Wisconstich filosofisch bedrijf.* Leiden 1667 (LUG). See § 29.

Fig. 25. *Les Artificiels chariots à voiles du comte* MAURICE. Amsterdam 1652 (BM). See § 59.

Fig. 26. *Comitis* MAURITII *Currus artificiales vento acti.* Amsterdam 1652 (BM). See § 59.

Plate 3. Fig. 27. Engraving by JACQUES DE GHEYN (?) Amsterdam 1652, representing STEVIN's sailing chariots (BM). The original engraving (without borders) measures 32.3 × 25.1 cm. See § 59.

Plate 4. Fig. 28. Engraving showing chassis of STEVIN's sailing chariot. Amsterdam 1652 (BM). Probably derived from the woodcut by C. v. SICHEM, published in Amsterdam 1612. See F. MULLER : *De Nederlandsche geschiedenis in platen* (vol. 1, 141, 1863-70).

Fig. 29. Equilibrium of ships. Figure taken from *Tomus quartus mathematicorum hypomnematum*. Leiden 1605, p. 179 (HUL). See § 23, 52.

Fig. 30. Lock. Figure taken from the *Nouvelle manière de fortifications par escluses*. Leiden 1618, p. 4 (HUL). See § 26, 57.

V. — APPENDIX

63*bis*. Reproduction in extenso of the text published in Amsterdam, 1652. See § 59 and figs. 25 to 28.

Les Artificiels Chariots à Voiles du comte Maurice.

Lesquels Chariots en 2 heures ont faict 14 lieuës de chemin : Sur ces chariots estoyent les Nobles du pays d'Hollande & quelques grands Seigneurs de Pays estranges, ensemble jusques au nombre de 28 personnes, comme la description suivante declare plus amplement.

Personne ne sera esmerveillé si je raconte comment les Hollandois ont faict par mer des lointains voyages aux pays mesme inconnus aux anciens escrivains, mais si je commence à dire qu'ils ont fait voyle sur terre avec un Chariot à voyle, tout le monde ne sera pas seulement esbahy, mais plusieurs (qui ne croyent rien que ce qu'ils voyent) ne le croyront pas. Mais l'incredulité des ignorans ne diminuë en rien les faicts ingenieux des sçavans, ainsi au contraire les font tant plus estimer de personnes de gentil esprit : ausquels j'adresse ce Chariot avec sa description touchee en peu de parolles pour laisser aux doctes ample matiere de le descrire. Ie descri le Chariot ou estoyt son Excellence.

Quant au Chariot & sa figure, n'attendés que je le vous d'escrive : le paintre, Mr. JAQUES DE GHEYN, a tellement satis-fait a cela, que ce seroit paindre Venus apres Apelle de le vouloir d'escrire. Il me suffira de vous raconter le voyage que ce Chariot a faict, & de nommer les principaux personnages qui nestoyent assis en iceluy.

Il y a une place aupres de la Haye, là estoit ce ou le Chariot a voyle fut tout prest sur la rive de la mer, attendant avec un ven de sudest la venue du tant renommé MAURICE DE NASSAU, lequel y vint avec quelques grands personnages, a scauoir le frere du Roy de Dennemarcq, le Comte HENRY, frere du Comte

de Nassau, avec quelques autres Seigneurs Alemands. Pardonnez moy si je ne mets au premier rang le Seigneur de BUSENVAL, Ambassadeur vers les Estats d'Hollande, de la part du Treschrestien Roy de France : nous escrivons cecy en Hollande, où son Excellence tient le premier rang. Or sans me mesler de Precedence (en laquelle je n'ay jamais estudié) je poursuyvray le reste. Là estoyt oultre quelques Seigneurs Angloys, l'Admirante d'Arragon : en quoy on peut voir combien civilement on traicte chez nous les prisonniers. Avec un mot vingt huict Personnes estoyent sur le chariot à voyle.

Ils ont choysi un vent de Sudest, & son montés a la rive de la mer; nommée de Sy, comme estant le costé du pays ou la mer nous separe du royaume d'Angleterre : là est le village Schevelingne sus mentionné, environ une lievë de le Haye, Court d'Hollande. Estant montés, son Excellence s'est mis au gouvernail : on a faict voyle. Voyla le vent qui pousse tellement ce Chariot, qu'il ne sembloyt pas rouler, ains voler, en sorte qu'on l'avoit si tost perdu, que veu.

Ils est tout subit venu devant l'ancien Village Catwijck, monstant nostre origine estre des Hessiens, nommés des anciens Catti : là est l'Ancien Chasteau submergé de la mer qu'on appelle la Tour de Capus : les Hollandois l'appellent het Huys te Britten.

De là il est venu a Noortwijck, ou son nès deux grands Poëtes renommés entre les doctes avec le nom de Dousa. Subit il passe Santvoort, Wijck, Egmont, renommé par son Comte. Enfin il est venu à la place nommée le Hondbosch : ou la mer faict tel esmoy, qu'il semble la Scylle des anciens, croule sur les cailloux & menace Hollande de submersion : là les mariniers sont en crainte de Naufrage : Si ceste place n'estoyt pas bien pourveus Hollande ne seroit point Land (C'est ádire Pays) mais une mer. Là est le Village de Petten, où on trouve des petites moules fort delicats. Bien pres de lá est la Sype, comme un Pays ravi à la mer, & gardé avec diques. La aupres est Marsdiep, Vli, & autres places. Le Chariot a fini son cours à Petten susnommé.

Or tout le chemin susdit se monte à quatorse lieuës, lequel ceste navire sur terre (ainsi je nomme le Chariot) fict en deux heures. Il ne sembloyt pas (comme j'ay dit) rouler, ains voler : & je ne scay si quelque oyseau volant apres sa proye pouvoit aller plus viste.

Les chevaux courrànts apres le Chariot, ne gaignoyent rien en courant à poste, le postillon du vent poussoit tellement ce Chariot, qu'il passoit l'œil humain. Une foys, pour faire jeu aux Seigneurs, son Excellence le faisoit rouler dans la mer, dont plusieurs estoyent fort estonnés, mais subit tournant le gouvernail, il print son cours sur la rive, & fit en deux heures le chemin susdict.

Les spectateurs, qui estoyent sur la rive, mais principalement ceux qui l'ont veu à la despourveuë, ne croyoyent a leur yeux, tant viste rouloit ce Chariot, en sorte que le cours de ma plume ne le peut suyvre.

Une infinitè de personnes tesmoignera tout cecy que j'ay racontè brievement de son voyage. Ne soyés donc plus lecteur, ains Spectateur : vojez le pourtraict que le paintre vous donne avec son burin, & vojez si vous pouvès imiter tel Artifice. Adieu amy Lecteur & Spectateur, prennez en grè ce que nous vous offrons d'aussi bonne affection, comme nous souhaitons qu'il soit reçeu de vous.

Harvard Library 185 GEORGE SARTON.
Cambridge, Mass.

Tafelen van

INTEREST,

Midtſgaders

De Conſtructie der ſelver, ghecalculeert

DOOR

Simon Stevin Brugghelinck.

T'ANTWERPEN,
By Chriſtoffel Plantijn in den gulden Paſſer.

M. D. LXXXII.

Fig. 3

PROBLEMATVM GEOMETRICORVM

In gratiam D. MAXIMILIANI, DOMINI A CRVNINGEN &c. editorum, Libri V.

Auctore

SIMONE STEVINIO BRVGENSE.

ANTVERPIÆ,
Apud Ioannem Bellerum ad inſigne Aquilæ aureæ.

Fig. 4

DIALECTIKE
OFTE
BEVVYSCONST.

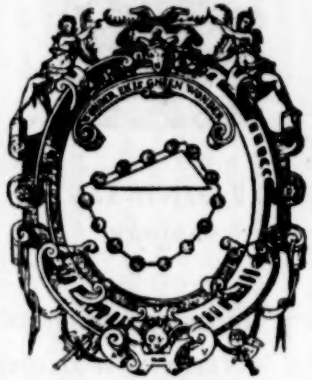
Leerende van allen ſaecken recht ende conſtelick Oirdeelen; Oock openende den wech tot de alderdiepſte verborghentheden der Natueren.

Beſchreven int Neerduytſch door
SIMON STEVIN *van Brugghe.*

TOT LEYDEN,
By Chriſtoffel Plantijn.
M. D. LXXXV.

Fig. 5

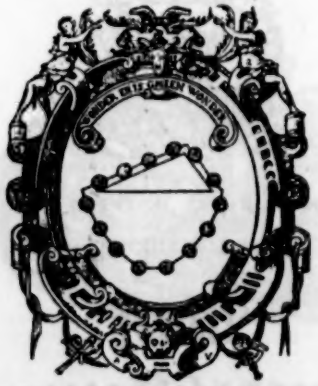
DE
BEGHINSELEN
DER WEEGHCONST
BESCHREVEN DVER
SIMON STEVIN
van Brugghe.



TOT LEYDEN,
Inde Druckerye van Chriſtoffel Plantijn,
By Françoys van Raphelinghen.
cIↃ. IↃ. LXXXVI.

Fig. 6

DE
WEEGHDAET
BESCHREVEN DVER
SIMON STEVIN
van Brugghe.



TOT LEYDEN,
Inde Druckerye van Chriſtoffel Plantijn,
By Françoys van Raphelinghen.
cIↃ. IↃ. LXXXVI.

Fig. 7

DE
BEGHINSELEN
DES WATERWICHTS
BESCHREVEN DVER
SIMON STEVIN
van Brugghe.

TOT LEYDEN,
Inde Druckerye van Chriſtoffel Plantijn,
By Françoys van Raphelinghen.
cIↃ. IↃ. LXXXVI.

Fig. 8

VITA POLITICA.

HET

Burgherlick leuen,

Beſchreuen deur

SIMON STEVIN.

TOT LEYDEN,

By Franchoys van Ravelenghien.

cIↃ. IↃ. XC.

Fig. 9

DE

STERCTENBOVWING,

Beſchreuen

door

SIMON STEVIN

van Brugghe.

TOT LEYDEN,

By Françoys van Ravelenghien.

cIↃ. IↃ. XCIV.

Fig. 10

DE HAVEN-VINDING.

TOT LEYDEN,
IN DE DRVCKERYE VAN PLANTIJN
BY CHRISTOFFEL VAN RAVELENGHIEM.
Gesworen druckер der Vniversiteyt tot Leyden.
cI2.'I2. IC.

Met priuilegie.

Fig. 11

THE HAVEN-FINDING ART,

Or

THE WAY TO FIND any Hauen or place at sea, by *the Latitude and variation.*

Lately published in the Dutch, French, and Latine tongues, by commandement of the right honourable *Count Maurice* of *Nassau*, Lord high Admiral of the vnited Prouinces of the Low countries, enioyning all Seamen that take charge of ships vnder his iurisdiction, to make diligent obseruation, in all their voyages, according to the directions prescribed herein:

And now translated into English for the common benefite of the Seamen of England.

Imprinted at London by G.B.R.N. and R.B.

1599.

Fig. 12

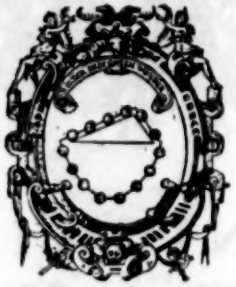
WISCONSTIGE GEDACHTENISSEN.

Inhoudende t'ghene daer hem in gheoeffent heeft

DEN DOORLVCHTICHSTEN

Hoochgheboren Vorst ende Heere, MAVRITS Prince van Oraengien, Grave van Nassau, Catzenellenbogen, Vianden, Moers &c. Marckgraef vander Vere, ende Vlissinghen &c. Heere der Stadt Grave ende Slanden van Cuyc, S'. Vyt, Dorsburch &c. Gouverneur van Gelderlant, Hollant, Zeelant, Westvrieslant, Zutphen Vtrecht, Overyssel &c. Opperste Vetheer vande verenighde Nederlanden, Admirael generael vander Zee &c.

Beschreven door SIMON STEVIN *van Brugghe.*



TOT LEYDEN,
Inde Druckerye van Ian Bouvensz.
Int Iaer cIↃ IↃ cVIII.

Fig. 13

TVVEEDE STVCK DER WISCONSTIGHE GHEDACHTNISSEN VANDE MEETDAET.

Inhoudende t'ghene daer hem in gheoeffent heeft

DEN DOORLVCHTICHSTEN

Hoochgheboren Vorst ende Heere MAVRITS Prince van Oraengien, Grave van Nassau, Catzenellenboghen, Vianden, Moers &c. Marckgraef vander Vere, ende Vlissinghen &c. Heere der Stadt Grave, ende Slanden van Cuyc, S'. Vyt, Dorsburch &c. Gouverneur van Gelderlant, Hollant, Zeelant, Westvrieslant, Zutphen, Vtrecht, Overyssel &c. Opperste Vetheer vande verenighde Nederlanden, Admirael Generael vander Zee &c.

Beschreven door SIMON STEVIN *van Brugghe.*

TOT LEYDEN,
By Ian Bouvensz. woonende op de hoogelantsche Kerckgraf,
Anno cIↃ IↃ cV.

Fig. 14

HYPOMNEMATA
MATHEMATICA.

Hic eſt eruditus ille pulvis, in quo ſe exercuit

ILLVSTRISSIMVS, ILLVSTRIS-
ſimo & antiquiſſimo ſtemmate ortus Princeps, ac Dominus,
MAURITIUS Princeps Auraicus, Comes Naſſoviæ, Catzenel-
bocorum, Viandæ, Moersii, &c. Marchio Veræ, & Vliſſingæ, &c. Dominus
civitatis Geræ, & dioeceſis Cuyc, civitatum Vyt, Daelburch, &c.
Gubernator Geldriæ, Hollandiæ, Zelandiæ, Weſtfrieſiæ,
Zutphaniæ, Vtrajecti, Tranſiſalaniæ, &c. Imperium
exercitus Provinciarum foederi confoederatarum Belgii, Archiſtatuſſus
Generalis, &c.

ad SIMONE STEVINO *conſcripta, & à Bibliopolis*
Latinis à VVIL. SN. *converſa.*

LVGDVNI BATAVORVM,
Ex Officinâ Ioannis Patii, Academiæ Typographi.
Anno CIↃ. IↃ. C. VIII.

Fig. 15

TOMVS QVARTVS
MATHEMATICORVM HYPOMNEMATVM DE
STATICA.

Quæ comprehenduntur ea in quibus ſeſe exercuit

ILLVSTRISSIMVS
Illuſtriſſimo & antiquiſſimo ſtemmate ortus Princeps ac
Dominus MAURITIUS Princeps Auraicus, Comes
Naſſoviæ, Catzenelbocorum, Viandæ, Moersii, &c. Marchio Veræ
& Vliſſingæ, &c. Dominus Civitatis Geræ & dioeceſis Cuyc,
Civitatum Vyt, Daesburch, &c. Gubernator Geldriæ,
Hollandiæ, Zelandiæ, Weſtfrieſiæ, Zutphaniæ,
Vtrajecti, Tranſiſalaniæ, &c. Imperium exer-
citus Provinciarum foederi confoederata-
rum Belgii, Archiſtatuſſus
Generalis, &c.

Conſcripta à SIMONE STEVINO *Brugenſi.*

LVGODINI BATAVORVM,
Ex Officinâ Ioannis Patii, Academiæ Typographi.
Anno CIↃ IↃ CV.

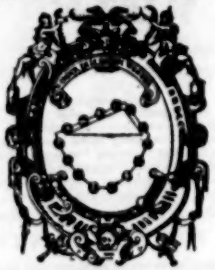
Fig. 16

MEMOIRES MATHEMATIQVES.

Contenant ce en quoy i'eſt exercé

LE TRES-ILLVSTRE, TRES-excellent Prince & Seigneur MAVRICE Prince d'Orange, Comte de Naſſau, Catzenellenboghen, Vianden, Moers, &c. Marquis de la Vere, & Vlißingues, &c. Seigneur de la Ville de Gueure, & du Pais de Cuyck, Soint Vyt, Dambourch &c. Gouverneur de Gueldres, Hollande, Zeelande, Weſtfrize, Zutphen, Vtrecht, Overyſſel &c. Chef General de l'armée des Provinces vnies du Pais bas, Admiral general de la Mer &c.

Deſcrit premierement en Les Memoires par SIMON STEVIN *de Bruges, puis mis en Pratique par* IEAN TVORE, *Eſcuier de Leur, & Ingenieur de Monſeigneur le* PRINCE HENRY, *Conte de Naſſau &c.*



A LEYDE,
Chez Ian Paedts Iacobsz. Marchand Libraire,
& Maiſtre Imprimeur de l'Vniverſité de ladite Ville.
L'An cIↃ IↃ C VIII.

Fig. 17

LIVRE DE COMPTE DE PRINCE A LA MANIERE D'ITALIE, EN DOMAINE ET FINANCE EXTRAORDINAIRE.

Eſtant aux memoires Mathematiques la deuxieſme partie des meſlanges,

Contenant ce en quoy i'eſt exercé

LE TRES-ILLVSTRE, TRES-EXcellent Prince & Seigneur MAVRICE Prince d'Orange, Comte de Naſſau, Catzenellenboghen, Vianden, Moers, &c. Marquis de la Vere, & Vlißingues &c. Seigneur de la Ville de Gueure, & du Pais de Cuyck, Soint Vyt, Dambourch &c. Gouverneur de Gueldres, Hollande, Zeelande, Weſtfrize, Zutphen, Vtrecht, Overyſſel &c. Chef General de l'armée des Provinces vnies du Pais bas, Admiral general de la Mer &c.

Deſcrit par SIMON STEVIN *de Bruges.*

A LEYDE,
Chez Ian Paedts Iacobsz. Marchand Libraire,
& Maiſtre Imprimeur de l'Vniverſité de ladite Ville.
L'An cIↃ IↃ C VIII.

On les trouve à vendre chés Louys Elzevier.

Fig. 18

CASTRAMETATIO,
Dat
LEGERMETING.

Beſchreven door *Symon Stevin* van Brugghe,

Na d'oordening en 'ghebruyc

VANDEN DOORLVCHTICHSTEN

Hoochgheboren Vorſt ende Heere MAVRITS PRINCE van Oraengien, Grave van Naſſau, Catzenellenbooghen, Vianden, Moers, &c. Marcgraef vanden Vere, ende Vlissinghen, &c. Heere der Stadt Grave, ende 'sLandts van Cuyc, S. Vyt, Dasborch, &c. Gouverneur van Gheldrelant, Hollant, Zeelant, Weſtvrieſlant, Utrecht, Vtrecht, Overyſſel, &c. Opperſte Veldheer vande verenichde Nederlanden, Admirael generael vanden Zee, &c.

Tot Rotterdam,
By Ian van Waesberghe, inde Fame.
Anno 1617.

Fig. 19

NIEVVE MANIERE
VAN
STERCTEBOV,
door Spilſluyſen.

Beſchreven door *Symon Stevin* van Brugghe.

Tot Rotterdam,
By Ian van Waesberghe, inde Fame.
Anno 1617.

Fig. 20

LA

CASTRAME-TATION.

Descrite par *Symon Stevin* de Bruges,
selon l'ordonnance & vsage

DE

TRESILLVSTRE. TRES EXCELLENT PRINCE ET

Seigneur MAVRICE, par la grace Dieu PRINCE d'Orangé, COVNT de Nassau, Catzenelenbogen, Vianden, Diets, Moers, Buren, Leerdam, Marquis de la Vere, & de Flessingues, Seigneur & Baron de Breda, de la Ville de Grave, & du Pais de Cuyck, Diest, Grimbergen, Arby, Nassroy, &c. Vicomte Hereditaire d'Anvers, & Besançon, Gouverneur & Capitaine General de Gueldres, Hollande, Zelande, Westfrise, Zutphen, Vtrecht, & Overyssel, &c. Admiral General, &c.

A LEYDE,

Chez Mathieu & Bonaventure Elzevier. 1618.

Fig. 21

LES

ŒUVRES Mathematiques

DE

SIMON STEVIN de Bruges.

Ou sont inserées les

MEMOIRES MATHEMATIQVES.

Esquelles s'est exercé le Tres-haut & Tres-illustre Prince MAURICE de NASSAU, Prince d'Aurenge, Gouverneur des Provinces des Pais bas unis, General par Mer & par Terre, &c.

Le tout reveu, corrigé, & augmenté

Par ALBERT GIRARD Samielois, Mathematicien.

A LEYDE

Chez Bonaventure & Abraham Elsevier, Imprimeurs ordinaires de l'Vniversité, ANNO CIↃ IↃ CXXXIV.

Fig. 22

MATERIÆ POLITICÆ.

BVRGHERLICKE STOFFEN.

VERVANGHENDÆ GHEDACHTENISSEN der oeffeninghen des Doorluchtichsten Hoogstgheboorens *Vorst en Heere* MAVRITS *by Gods Genade Prince van Oranje &c. Ho: Lo: Ghedachtenisse.*

Beschreven deur zal: SIMON STEVIN van Brugghe, den selfs Heere Princen Superintendent vande Financie &c. En op hen naghelaten Manuscripten by een ghestelt door Zijn Soon HENDRICK STEVIN Ambachtsheere van Alphen.

TOT LEYDEN,
Ter Druckerye van IVSTVS LIVIVS,
tegen over d'Academie.

Fig. 23

WISCONSTICH FILOSOFISCH BEDRYF,

Van *Hendric Stevin* Heer van Alphen, van Schrevelsrecht, &c.

BEGREPEN

In veertien Boeken.

TOT LEYDEN,
Gedruckt by PHILIPS DE CRO-Y, in't Jaer 1667.

Fig. 24

Les Artificiels
CHARIOTS A VOILES
du Comte Maurice.

Lesquels Chariots en 2 heures ont faict 14 lieües de chemin : Sur ces chariots estoyent les Nobles du pays d'Hollande & quelques grands Seigneurs de Pays estranges, ensemble jusques au nombre de 28 personnes, comme la description suivante declare plus amplement.

PErsonne ne sera esmerveillé si je raconte comment les Hollandois ont faict par mer des lointains voyages aux pays mesme inconnus aux anciens escrivains, mais si je commence à dire qu'ils ont fait voyle sur terre avec un Chariot à voyle, tout le monde ne sera pas seulement esbahy, mais plusieurs (qui ne croyent rien que ce qu'ils voyent) ne le croyront pas. Mais l'incredulité des ignorans ne diminue en rien les faicts ingenieux des sçavans, ains au contraire les font tant plus estimer de personnes de gentil esprit : ausquels j'adresse ce Chariot avec sa description touchee en peu de parolles pour laisser aux doctes ample matiere de le descrire. Ie descri le Chariot ou estoyt son Excellence.

Quant au Chariot & sa figure, n'attendés que je le vous d'escrive : le paintre, Mr. Jaques de Gheyn, a tellement satis-fait a cela, que ce seroit paindre

Fig. 25

Comitis Mauritii
CURRUS ARTIFICIALES
Vento acti.

Hi currus duarum horarum spatio quatuordecim itineris milliaria perfecerunt, iisque Nobiles Hollandos una cum Magnatibus alienigenis quibusdam, numero 28, vecti quondam fuere, ut sequens descriptio latius manifestat.

NEmo mirabitur, si enarrem Hollandos diuturnis navigationibus per mare in regiones etiam antiquis scriptoribus incognitas fuisse peregrinatos ; Statum verò ac dixero eos curru a veneto acto in ipsâ terrâ vela fecisse, universus terrarum orbis non solum admirabundus obstupescet, sed multi (qui nihil credunt nisi quod vident) fidem non adhibebunt. Verum ignorantium incredulitas actibus illis, in quibus ingenii humani acies elucet, nihil prorsus suburabit, quin potius illos viris cordatis tanto magis commendat, quibus ejusdem hunc currum, cum tota descriptione paucis perstrictâ .., offerendum putavi, eoque doctis ampliorem illum describendi materiam præbui. Currum autem quem describo ille est, quo sua Excellentia vehebatur. Quantum ad Currus istius figuram attinet, me illum vobis depingere nullatenus expectate. Pictor Magister Jacobus de Ghein huic rei adeo satisfecit, ut qui post illum id tentare conaretur, Venerem ab Apelle pictam pingere velle videretur. Iter ab illo curru confectum vobis enarrare, & præcipuos qui in illo curru sedebant recensere, mihi satis erit. Locus est prope Hagam Comitis, ubi erat currus velifer juxta littus maris præparatus, & expectans cum vento meridionali adventum Illustrissimi viri Mauritii à Nassau. Qui utique illuc venit cum Magnatibus nonnullis, videlicet fratre Regis Daniæ, Comite Henrico, fratre Comitis à Nassau, cum quibusdam aliis Nobilibus Germaniæ. Date mihi veniam si non primo loco colloco dominum à Busenval, Christianissimi Galliæ Regis apud præpotentes Hollandiæ ordines Legatum ; Hæc enim in Hollandia scribimus, ubi sua Excellentia primum locum obtinet. Omissis autem quæ ad præeminentias spectant (quibus nunquam studuit)

Fig. 26

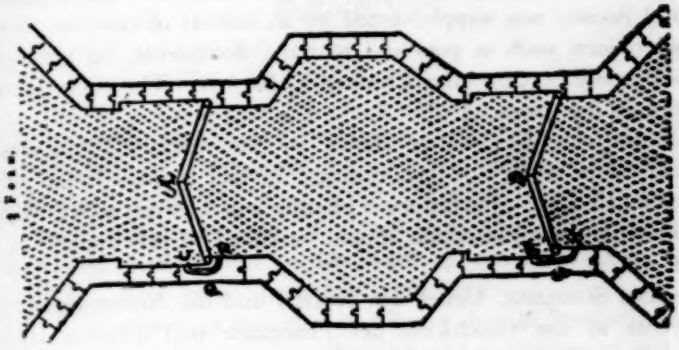


Fig. 30
Lock.

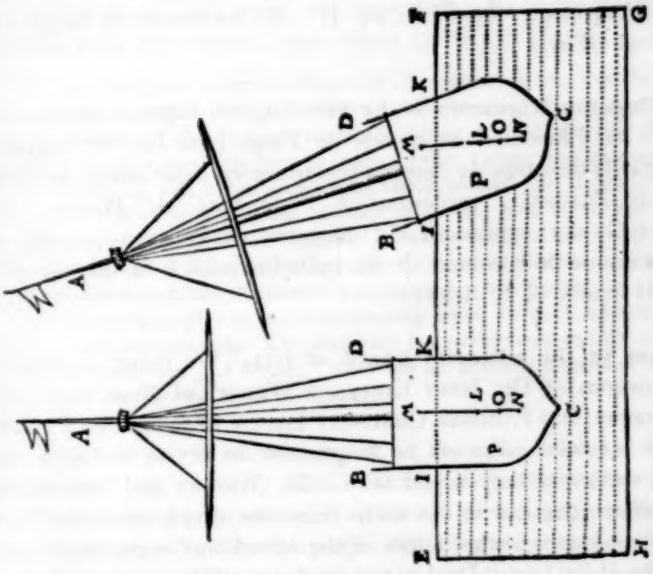


Fig. 29
Equilibrium of ships.

Notes and Correspondence

Teaching of the History of Pharmacy. — At the special request of the Chm. Ex. Com. of the Am. Assn. of Colleges of Pharmacy, EDWARD KREMERS read a paper on this subject at the Madison meeting, Aug. 1933. The reading of the paper in the Museum of the Wisconsin Historical Society was supplemented by an exhibit of material (books, pictures, objects such as pots and mortars, documents, etc.) arranged for this purpose by Custodian CHARLES E. BROWN. The paper is to be published in the *Journ. A. Ph. A.*

Significant was the interest shown by the assembled teachers of pharmacy in the history of their calling. Several expressed their desire to introduce courses on the history of pharmacy in their respective colleges.

In this connection, attention should be called to two papers on the subject, viz. :

HERMANN SCHELENZ, Ueber den Nutzen und die Notwendigkeit des Unterrichts in der Geschichte der Pharmazie und Chemie an den Hochschulen. Reprint from the *Sueddeutsche Apotheker-Zeitung*, 1905, Nos. 70 and 71.

GEORG URDANG, Wesen und Bedeutung der Geschichte der Pharmazie. Drei Vortraege. Pamphlet, pp. 41. JULIUS SPRINGER, Berlin, 1927.

(Madison, Wisc.) E. KREMERS.

Prix Eugenio Rignano. — Le Prix Eugenio Rignano à décerner à un travail sur l'*Évolution du concept de Temps* (voir *Isis*, 17, 263) a été attribué par la direction de *Scientia* constituée en commission du jury, à SIGISMUND ZAWIRSKI, professeur à l'université de Poznán, et à GIOVANNI GIORGI, professeur à l'université de Palermo qui ont reçu chacun la moitié de la somme de dix mille lire mise à la disposition du jury par la famille de E. RIGNANO. L. G.

Changes in the editorial board of Isis. We regret to announce the resignations of Dr. JOHN KIRTLAND WRIGHT of New York, editor for Geography, and Professor CHAUNCEY DEPEW LEAKE of San Francisco, editor for Medicine, who are no longer able to devote to *Isis* as much time and energy as they would wish. Dr. WRIGHT had been working with us since 1924 and in the early years was deeply interested in the history of geography ; other duties of the American Geographical Society are now absorbing him. Dr. LEAKE joined our staff in 1931 ; his historical curiosity is just as keen as ever but other responsibilities are piled on his shoulders and take him away from *Isis*. We much hope that they will continue to coöperate with us occasionally, for we need their friendship and their help. G. S.

Reviews

T. Eric Peet (d. 1934). — *A comparative study of the literatures of Egypt, Palestine, and Mesopotamia. Egypt's contribution to the literature of the Ancient World.* viii+136 p. (The Schweich lectures of the British Academy, 1929). London, HUMPHREY MILFORD, 1931.

James Henry Breasted. — *The dawn of conscience.* xviii+431 p., 19 fig. New York, SCRIBNER's, 1933 ($3).

Historians of science owe already a heavy debt to Professor BREASTED for his monumental edition of the Edwin Smith surgical papyrus (Chicago, 1930) of which we published an elaborate review (*Isis*, 15, 355-67). Their debt is still increased by the publication of the present volume, less ambitious and less novel, yet important. Its purpose can best be indicated with the author's own words (p. xv) :

" The ripe social and moral development of mankind in the Nile Valley, which is three thousand years older than that of the Hebrews, contributed essentially to the formation of the Hebrew literature which we call the Old Testament. Our moral heritage therefore derives from a wider *human* past enormously older than the Hebrews, and it has come to us rather *through* the Hebrews than *from* them. The rise of man to social idealism took place long before the traditional theologians' " age of revelation " began. It was a result of the social experience of *man himself* and was not projected into the world from the outside... With that achievement man had discovered a new country, but he had not yet explored it. The *discovery itself* was an incomparably more difficult achievement than the subsequent explorations. The discovery is a *recent* event and the explorations have consequently but just begun. They are an unfinished process which must be continued by us—by *every* generation."

I think I hear one of our readers ask : " Does this belong to the history of science ? " It certainly does. The growth of science postulates a sufficient development of moral and social ideas; it is not by accident that in Egyptian as in other languages including our own the same words are used to designate the ideas of justice and truth. (1) I had already insisted upon that in the first volume of my *Introduction*, but my knowledge

(1) The Egyptian word is *maâ-t* (BUDGE's *Hieroglyphic dictionary*, 1920, p. 271). Compare our use of the word *right* both in a scientific and a moral sense.

of Egyptian literature at that time (2) was rudimentary and the short note relative to Egyptian monotheism (p. 58) is quite insufficient.

A good many valuable publications have already been devoted to Egyptian literature, and even to their " wisdom " literature (in the Biblical sense), chiefly since the revelation of the extraordinary text called the Teaching (or the Wisdom, or Proverbs) of AMENOPE, which Sir ERNEST BUDGE brought back from Egypt in 1888, but which remained practically unknown until his account of it in the *Recueil* CHAMPOLLION (1922, 431-46). Sir ERNEST gave a facsimile edition of the whole text together with transcription and translation in the following year (British Museum). Since then many other studies have been devoted to AMENOPE and his influence on the Old Testament by BUDGE himself, LUDWIG KEIMER, H. O. LANGE, ADOLF ERMAN, F. LLEWELLYN GRIFFITH, DAVID CAPELL SIMPSON, PAUL HUMBERT, etc. (3) However it so happens that the *Wisdom of* AMENOPE is a relatively late production—it can hardly be earlier than the beginning of the tenth century B.C., and it is well to make people realize that Egyptian literature and wisdom are considerably more ancient. Moreover it cannot be said that the knowledge of Egyptian literature is very popular yet, even among Old Testament scholars (who ought to know better) or among the people whose privilege it was to travel in the Nile Valley. Hence a semi-popular book like this one answers a real need and one must be grateful to Professor BREASTED for having taken the trouble of writing it. It gives me a pleasant opportunity for bringing those weighty matters to the attention of our scientific readers; as space in *Isis* is limited the purpose of my review is simply to whet their curiosity and induce them to tackle the book itself.

This work is not like a few others which are reviewed from time to time in this journal for the purpose of directing the attention of our readers to neighboring fields; it does not concern a borderland but the very heart of our own territory. It interests us all very deeply and in two different ways : in the first place it helps us to understand the growth of man's conscience; in the second place, it affords us an additional proof of the oriental origins of our culture. Fifty years ago we used to conceive our intellectual origins as double : Greek and Hebrew. It has since been proved in sundry ways by many scholars that the Greeks were not really the inventors of science, but that they transmitted to us after having marvelously enriched it, a capital of knowledge which they had themselves borrowed from Egypt and Mesopotamia. A similar

(2) The ms. of my vol. 1 was completed in June 1926, but the beginning of that volume is at least a year earlier.

(3) See the Egyptian bibliographies regularly published in *Isis*, e.g., 12, 395-6; 16, 514.

demonstration is now complete with regard to Israel. Hence the two sources of fifty years ago, Greece and Palestine, are now replaced by two more distant ones, Egypt and Mesopotamia, and of these the former seems to be—all considered—the most important.

As far as Biblical origins are concerned, the early Babylonian discoveries were so startling that they gave us extravagant hopes which did not entirely materialize. At any rate these hopes were very useful for they stimulated considerably Sumerian, Babylonian, and Assyrian investigations. An English society which did very much to promote such investigations in the early days was typically called " The Society of Biblical Archaeology." (4) Biblical scholars have gradually learned to turn toward Mesopotamia, they must now be taught to pay more attention to Egypt and they will soon discover—e.g., if they take the trouble of studying BREASTED's book—that as far as our religious origins are concerned the influence of Egypt was considerably larger and more persistent than that of 'Irāq.

The importance of Egypt is accounted for not only by the extraordinary physical opportunities of the Nile Valley, but also by the creation in that favored region of a great unified state earlier than anywhere else. The Egyptians had already enjoyed a centralized government long before the First Dynasty, even before the year 4000. That centralization did not last very long, but another began with the First Dynasty and lasted until the end of the Sixth Dynasty; that is, from c. 3400 to c. 2475, or almost a full millennium. Think of that: a thousand years of peaceful and uninterrupted progress affecting millions of people. The Babylonian political conditions of those times were far inferior; and their moral and legal achievements were inferior too. Even later (in the twentieth century) when the Egyptians had already conceived the idea of equal guilt for equal offense, HAMMURAPI's code was still dispensing justice according to the social station of the litigant or the offender.

I wish to illustrate the antiquity of the Egyptian contributions and the heaviness of our debt to them by means of a few examples which could easily be multiplied.

The earliest discussion of right and wrong in the history of man is to be found in the so-called *Memphite drama*, which we only know through a copy on a slab of basalt made by order of an Ethiopian king of the eighth century; the slab was used as a nether millstone and hence the inscription is much damaged; it is now preserved in the British

(4) Founded in 1870, lasted fifty years during which it published nine volumes of *Transactions* and forty volumes of *Proceedings*. In 1919 it was amalgamated with the Royal Asiatic Society. See Sir E. A. WALLIS BUDGE: *The rise and progress of Assyriology* (London, 1925, 261-5).

Museum. The text itself goes back at least to the Old Kingdom, probably to the beginning of it (c. 3400). Its purpose is " to account for the origin of all things including the moral order of the world and to show that they had their origin in Ptah of Memphis " (BREASTED, p. 29-42). The distinction between right and wrong is really a distinction between " what is loved " and " what is hated "; life is given to the peaceful and death to the guilty. We recognize in that text of five thousand years ago the earliest adumbrations of the idea of final judgment and of the idea of logos.

The following landmark in the intellectual history of Egypt is the appearance of IMHOTEP at the beginning of thirtieth century. IMHOTEP was the grand vizier of king ZOSER of the Third Dynasty, the Egyptian prototype of AESCULAPIUS, the creator of the first stone architecture (step-pyramid of Ṣaqqāra), " the first outstanding individual in human history." Countless generations revered him not only as a leech but as a sage. The late JAMIESON B. HURRY (1857-1930) devoted an interesting book to him (1926, 2nd ed. 1928; *Isis*, 13, 373-75). (5) IMHOTEP's wise sayings are unfortunately lost.

Within the third millennium the idea of judgment after death became gradually more definite, and the Egyptians were obsessed with thoughts concerning the hereafter. The gigantic pyramids of Gîza testify to this, for they were built largely to achieve the king's immortality by sheer physical force (Fourth Dyn., thirtieth to the twenty-eighth cent.).

The *pax aegyptiaca* extending over a large territory and a great many generations favored the development of family life and domestic morality. Paintings and inscriptions in the older tombs of Memphis (Ṣaqqāra) give us an abundance of information about this. They enable us as it were to witness the emergence of moral order.

The most remarkable document of that age is the one which may be called the *Proverbs of* PTAHHOTEP, of which our earliest papyrus is only of the Twelfth Dynasty (i.e., after 2000), but the text may probably be traced back to the PTAHHOTEP who was grand vizier to king ISESI of the Fifth Dynasty in the twenty-seventh century. If that identification is accepted, his proverbs are the earliest formulation of right conduct in any literature (BREASTED, p. 129). Here are a few extracts (6):

" Be not arrogant because of thy knowledge, and be not puffed up for that thou are a learned man. Take counsel with the ignorant as with the learned, for the limits of art cannot be reached, and no artist is perfect in his excellence,

(5) In my review, p. 374, l. 21, instead of nineteenth read twenty-ninth.

(6) I quote them from PEET's book (p. 101-103), because PEET's versions are more fluent and elegant than those of BREASTED.

Goodly discourse is more hidden than the precious green-stone, and yet it is found with slave-girls over the millstones."

" If thou wouldst prolong friendship in a house where thou visitest as possessor, as brother or as friend, in whatsoever place thou frequentest beware of approaching the women. It is no fit place wherein to do it. There is no wisdom in the indulgence of lust, and a thousand men have been led aside from their good. A little moment, like to a dream, and death is the penatly for enjoying it."

" If thou be wise marry. Love thy wife sincerely. Fill her belly and clothe her back. Oil is the remedy for her body. Make glad her heart all thy life. She is a profitable field for her lord." (Cf. *Qur'ân* 2 : 223).

For the second half of the Old Kingdom we have a fairly abundant literature, the so-called *Pyramid Texts*. This name is given to the long inscriptions contained in five of the Ṣaqqāra pyramids and placed there by a group of kings including the last of the Fifth Dynasty and his four successors, the first four kings of the Sixth Dynasty (c. 2625 to c. 2475). Their main purpose is to insure the king's felicity in the hereafter but they constantly reflect the ebb and flow of the life around them. Their contents are in the main sixfold :

" A funerary ritual and a ritual of mortuary offerings at the tomb, magical charms, very ancient ritual of worship, ancient religious hymns, fragments of old myths, prayers and petitions on behalf of the dead king. In their modern published form, including the variants, they fill two quarto volumes containing together over a thousand pages of text. The ancient editor has divided them into 714 ' Utterances '."

" While the Pyramid Texts have not been able to shake off the old view of the sojourn at the tomb, they give it little thought, and deal almost entirely with a blessed life in a distant realm. It is of not a little interest that this distant realm is the sky, and that the Pyramid Texts know practically nothlng of the gloomy hereafter in the Nether World. The realm of the dead, therefore, is a celestial one, using the term with none of its frequent theological significance in English. That the conception of a celestial paradise, later universal in the Christian world, had its origin in the same enormously old Egyptian belief can hardly be doubted." (BREASTED, p. 71, 72.)

The faith which those texts represent is essentially Solar, but somewhat later there developed another stream of religious thought suggested by the miraculous fertility of plants and animals, and symbolized by the stories of the OSIRIS cycle. One can follow that stream of thought not only in Egypt but all over Western Asia and even in Greece. Traces of it may be detected in the New Testament (I Cor. 15:36) and our Easter festival is a sublimated continuation of it.

The two traditions—Solar and Osirian—were eventually mixed, and the religious history of Egypt is largely the history of their rivalries and vicissitudes. That evolution may be followed in the Pyramid Texts which were gradually Osirianized. By the way, even as the Solar

mythology is the origin of our Heaven, the Osirian legends are the source of our Hell. It is interesting to note that we find in the Pyramid Texts references to an early age of innocence, an idea which has since then reappeared in many literatures. (7)

By the end of this period (twenty-fifth century), the idea of *maâ-t* (conscience, order, justice) was firmly established in the Nile Valley. For the formulation of equivalent ideas in other countries we have to wait more than seventeen centuries until the time of ZARATHUSTRA and of the Hebrew prophets.

During that millennium of unity and peace (thirty-fifth to the twenty-fifth centuries) the very progress of conscience had helped the wiser men to realize that immortality could not be achieved by means of pyramids, but only by spiritual efforts. This must have caused a disillusionment (at least for the kings !) but also a purification. After the collapse of the Old Kingdom in the first half of the twenty-fifth century there followed a period of anarchy (the " Feudal Age ") which lasted almost five centuries and influenced men's thoughts very deeply. The hope of immortality was dimmed and men's conscience reeled. This was the earliest age of social disillusionment (p. 181), which is represented by a number of texts.

For example, the instruction addressed to MERIKERE by his father, an unknown king of Heracleopolis (8) (c. twenty-third century). The *Instruction to* MERIKERE (Leningrad papyrus) is a treatise on the conduct of kings; the Egyptian prototype of a class of books of which our Middle Ages produced many examples in Arabic and in Latin : *De eruditione regum* (9).

" Do justice [says the king], that thou mayest endure upon earth. Calm the weeper. Oppress not the widow. Expel no man from the possessions of his father. Degrade not magistrates from their posts. Take heed lest thou punish wrongfully. Slaughter not, for it doth not profit thee... God knoweth the froward, and God requiteth his sins in blood.

" As for the Magistrates who judge sinners, mark thee that they will not be lenient on that day of judging miserable men in the hour of performing their function. Woe to him who is accused as one conscious of sin ! Put not thy faith in length of years, for they regard a lifetime as but an hour. A man surviveth after reaching the haven of death, and for sole treasure there are laid beside him his deeds. Eternal is the existence yonder, and he who hath made light of it is a fool. But as for him who hath reached it without wrongdoing, he shall continue yonder like a god, stepping forward boldly like the Lords of Eternity." (PEET, p. 108.)

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(7) G. SARTON : SIMON STEVIN (*Isis*, 21, 259).

(8) About 10 m. west of Beni Suef, which is on the Nile 77 m. above Cairo.

(9) *Introduction* (vol. 2, by index).

A text which reflects admirably the pessimism of the Feudal Age though it was written some time after the end of it, at the beginning of the Twelfth Dynasty (2000-1788) is the *Dispute of a man with his soul* —a masterpiece of the Egyptian wisdom literature.

Listen to this fragment of it :

" Death is in my eyes today
As when a sick man becomes whole,
As the walking abroad after illness.

" Death is in my eyes today
Like the scent of myrrh,
Like sitting beneath the boat's sail on a breezy day.

" Death is in my eyes today
Like the smell of water-lilies,
Like sitting on the bank of drunkenness.

" Death is in my eyes today
Like a well-trodden road,
As when men return home from a foreign campaign.

" Death is in my eyes today
Like the unveiling of the heaven,
As when a man attains there to that which he knew not.

" Death is in my eyes today
Like the desire of a man to see his home
When he hath passed many years in captivity."

I quote this poem from PEET's book (p. 116), where it is followed with the remark : " SHELLEY has said more wonderful things about death than this, but I question whether he or any one else has said anything more beautiful in its simplicity." The whole work suggests comparison with the *Book of* JOB, which was composed some fourteen centuries later.

Babylonian texts of a similar kind have been found in ASSURBANIPAL's library (an Assyrian library of the seventh century); they cannot be exactly dated and may be as old as the Egyptian texts, or even older. See the Babylonian proverbs quoted by PEET on p. 113—they include " *Unto him that doeth thee evil shalt thou return good*,"—and the " literary psalm," on p. 123-4, which also invites comparison with JOB. These two Babylonian texts are very beautiful indeed, and though they are not datable, they are certainly older than JOB or even than anything else in our Old Testament.

To return to Egypt, the pessimistic utterances of which I have quoted two examples were balanced by others in a more optimistic vein symboliz-

ing generous efforts toward social justice. For example, among the *Coffin Texts*, we find the following declarations ascribed to the Sungod, RE (BREASTED, 221).

" 'I have made the four winds that every man might breathe thereof like his brother during his time... I have made the great waters that the pauper like the lord might have use of them... I have made every man like his brother, and I have forbidden that they do evil, (but) it was their hearts which undid that which I had said." (10)

Unfortunately such sayings are not frequent, for the *Coffin Texts*, and the *Book of the Dead* which grew out of them, are essentially magical—hardly more than collections of charms and rites; they enable us to realize the steady growth of Egyptian magic and the fossilization and decadence of Egyptian religion.

" That which saves the Book of the dead itself from being exclusively a magical vade-mecum for use in the hereafter is its elaboration of the ancient idea of the moral judgment, and its evident appreciation of the burden of conscience. We have seen that before the Feudal Age, the relation with God had become something more than merely the faithful observance of external rites. It had now become a matter of the heart and of character." (BREASTED, 269.)

Yet this was not by any means the end of the astounding Egyptian evolution, and a second renaissance occurred in the Eighteenth Dynasty (beginning of New Kingdom), of which the intellectual climax was the age of AMENHOTEP IV (c. 1375-50). The Eighteenth Dynasty was a period of universal domination and unification, which was finally introduced by AMENHOTEP IV into the very heart of religion. There was but one Pharaoh, there should be but one god. As BREASTED wittily remarks (p. 275), that early Egyptian monotheism was " but imperialism in religion." AMENHOTEP's One-God was the Sun-God RE, who to complete the reform received a new name ATON (old word designating the sun disk), while the king changed his own name from AMENHOTEP (suggesting the old religion) to IKHNATON (ATON is satisfied) and his capital Tell el-'Amārna was named Akhetaton (horizon of ATON). We know the intellectual side of IKHNATON's revolution only through a few fragments and hymns, of which the most famous is the one entitled by PEET " Adoration of the disk by king AKHENATEN and queen NEFERTETE " (11) (78-81; or BREASTED, p. 281-6). The hymn is too long to be

(10) For the *Coffin Texts* of which the Oriental Institute is preparing a monumental edition see J. H. BREASTED : *The Oriental Institute* (Chicago, 1933, p. 149-68).

(11) The whole world knows NEFERTETE because of her bust in the Berlin Museum, which enjoys an immense popularity.

quoted in full, and I do not like to mutilate it, but here is PEET's comment (p. 78):

"The parallels with the 104th Psalm may be quite fortuitous, but there are several circumstances which tend to make it a document of importance in the literary history of the world. In the first place it is the earliest truly monotheistic hymn which the world has produced. In the second place the desire of the king to break with tradition fortunately closed to him that morass of mythology from which most earlier hymns had drawn their material. And in the third place it breathes that delight in nature and her works which the religion of the Disk seems to have brought so much into prominence."

As to the delight in nature, the joy and the freedom of that age, the graceful and tender art of Tell el-'Amārna and of TUTENKHAMON's tomb gives us the most convincing proof. Unfortunately this monotheistic reform did not outlive its founder and was followed by an iconoclastic and savage reaction. After AMENHOTEP's death the priests of the old religion resumed their power, and AMENHOTEP's second successor and son-in-law, TUTANKHAMON moved to Thebes. (12) We are not concerned at present with the rest of Egyptian history and the final sterilization of its religious life under magical and clerical influence; but we may bear in mind that the evolution I have outlined lasted more than two and a half millennia and was ended six centuries before AMOS' day!

In spite of the general execration of IKHNATON's monotheism it did not completely die out and traces of a special devotion to One-God, whether the Sun-God or AMON, reappeared from time to time in the thirteenth and twelfth centuries, enriched with a sense of humility and an admission of sin, the like of which was entirely absent from the *Book of the Dead* (BREASTED, 317). If we reflect that a proper feeling of unworthiness and humility is an essential part of religion then these novelties are truly important. Finally toward the beginning of the first millennium, that is, three and a half centuries after IKHNATON, Egypt gave us another philosophical masterpiece, the *Wisdom of* AMENOPE, to which I referred at the beginning of this review.

BREASTED's final chapter is entitled "Sources of our moral heritage." It contains a demonstration of the Hebrew borrowings from Egyptian literature, and also from the Hittite, Babylonian and Iranian traditions. The last named may have reached Israel directly or via Mesopotamia

(12) There are many portraits of him. His tomb, among the Tombs of the Kings in Thebes, was discovered by HOWARD CARTER on Nov. 4, 1922. Its gradual revelation thrilled the world and its treasures are now the most popular attraction of the Cairo Museum, a popularity which is well deserved but too exclusive.

after the Exile. In fact the reactions between the people of the Near East were extremely complex. For example, BREASTED noticed in the ruins of CYRUS' palace near Pasargadae a relief sculpture representing a winged being bearing the OSIRIS crown ! (13) Hence Iranian influences might be exceptionally the vehicle of Egyptian ones.

In fact Palestine and Syria constituted a land bridge between Egypt and Western Asia, and interchanges of every kind between those countries were never interrupted. One cannot dig anywhere in Syria, especially along the Phoenician coast, without uncovering Egyptian objects. In the narrow pass at the mouth of the Nahru-l-kalb, north of Beirût, one may see carved in the rocks a whole series of inscriptions—Egyptian (RAMSES II), Assyrian, Chaldaean—not to speak of later ones (14). Would those people have exchanged everything except ideas? There is no difficulty in explaining Egyptian influences in the Holy Land; it would be very difficult to account for the lack of them.

BREASTED has put together many interesting proofs of Egyptian influences upon the Old Testament. MOSES was not only born in Egypt, but he bears an Egyptian name (15). His Egyptian learning is admitted in the Gospel (Acts 7:22). Circumcision is an Egyptian rite of immemorial age. Bodies exhumed from prehistoric cemeteries (back of 4000) have disclosed the evidence of it, and the operation itself is delineated on a tomb relief of Memphis of the twenty-eighth or twenty-seventh century. The weighing of the heart (Proverbs, 21:2) is a reminiscence of the Osirian judgment. The story of JOSEPH is drawn from an Egyptian folk tale, the tale of the two brothers (16). Consider the verse " But unto you that fear my name shall the sun of righteousness arise with healing in his wings " (Mal. 4:2). That winged sun was suggested by the Egyptian Sun-God. Ivory plaques representing scenes of Egyptian mythology have been discovered in the palace of the northern Hebrew kings (c. 850-750) at Samaria by the Harvard Expedition (BREASTED, fig. 18). The phrase " the shadow of my wings " referring to God, which occurs four times in the Psalms (17:8, 36:7, 57:1, 63:7) is clearly an Egyptian image (see the Medinet Habu relief, reproduced by BREASTED, fig. 19).

When we come down to the time of AMENOPE the parallelism becomes

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(13) It is reproduced in FRIEDRICH SARRE and ERNST HERZFELD : *Iranische Felsrelief* (Berlin, 1910, pl. 28).

(14) RENÉ MOUTERDE : *Le Nahr el Kelb* (Beyrouth, 1932, 34 p., 8 pl.).

(15) MOSE : the final *s* of the English form is due to the Septuagint. It does not appear in the Egyptian original, nor in Hebrew, nor yet in Arabic.

(16) BREASTED (357-9), PEET (44). PEET is not sure that the Hebrew story was inspired by the Egyptian one. Read them both and judge for yourself.

so evident that no one could deny it. Of course at that time the influence of Egypt upon Palestine must have reached a climax because of the prolonged Egyptian domination. The ressemblances between the *Wisdom of* AMENOPE on one hand, and on the other hand JEREMIAH, the first psalm, and above all the *Book of Proverbs* are so numerous and so clear, that it is certain that the Hebrew authors knew the *Wisdom of* AMENOPE (or another Egyptian source equivalent to it). In fact the resemblances are so great that the Egyptian text has actually been used to emend the Hebrew one. I shall not insist upon this as this special comparison—AMENOPE vs. *Proverbs*—is becoming a little trite.

Even if the points of contact between our Scriptures and the Egyptian and Babylonian writings were more abundant than they are—and they will very probably increase in number as other ancient texts are discovered—would this diminish the value of Hebrew literature? Of course not. Did SHAKESPEARE lose an inch of his stature when his sources were ferreted out? Of course not. The comparison with SHAKESPEARE is apt, for in both cases the borrowings are numerous and the literary superiority of the borrowers overwhelming. We must still speak of the "Hebrew miracle" even as we speak of the "Greek miracle" in spite of the fact that we cannot think any more of either Greeks or Jews as complete innovators, but rather as transmitters, pupils of other people, yet pupils who surpassed their masters immeasurably.

In spite of the length of this review it has not by any means exhausted the interest of BREASTED's book; there are many points which I have not even touched. My only criticism of it is that it is a little repetitious. It is a pity that the author could not devote more time to the final editing of it, but this is hardly surprizing for the direction of the multifarious activities of the Oriental Institute of Chicago must leave him, one would think, little energy for anything else. The wonder is that he could find time to write this book at all.

The author of the other book, THOMAS ERIC PEET, is best known to our readers through his edition of the Rhind mathematical papyrus (London 1923; *Isis*, 6, 553-7) but other books and papers of his have been frequently mentioned in this journal. The subject of this new book of his, his Schweich lectures delivered before the British Academy, 1929, is very different from that of BREASTED's book. BREASTED is more interested in the ethical contents of the Egyptian texts, PEET in their literary form. However as form and contents are as inseparable as soul and body, both authors cannot help covering the same ground. PEET's main purpose is to prove that we can truly speak of an Egyptian literature (and secondarily of a Babylonian one)—not only of Egyptian texts. His charming little book has been a revelation to me, for I had often

read Egyptian texts in learned memoirs but I had never read them as pure literature as he so graciously enticed me to do. To those who take the attitude that the Old Testament is literature, great literature, but that the Egyptian (and Babylonian) texts are only writings I could not recommend a better antidote than this book, the effectiveness of which is increased by the author's own artistry and moderation.

GEORGE SARTON.

Duncan Black Macdonald.—*The Hebrew literary genius. An interpretation.* Being an introduction to the reading of the Old Testament. XXIV+227 p. Princeton, University Press, 1933 ($2.50).

When I was reviewing the MACDONALD *Festschrift* some time ago (*Isis*, 21, 226), the pleasure which it gave me was doubled because I knew that it was not a final apotheosis (as such productions often are), but on the contrary that the loved jubilarian had two more works on the stocks. This is the first, and the second on " The Hebrew philosophical genius " is on the way.

While the author has not always been able to conceal his vast erudition, this is a book of wisdom rather than a book of learning. The purpose of it can best be indicated using the author's own words (p. 216):

" One of the strangest paradoxes of the situation in which the religious public finds itself at present is the indifference which that public has developed towards the Old Testament. The Old Testament simply does not interest it and it has in consequence even reached a point of ignorance where it doubts—or is quite certain—that the Old Testament has neither meaning nor value for modern life. This is largely, or entirely, the fault of the professed Old Testament scholars and students. They have worn out the patience of the mass of readers with their mechanical analyses and verbal details—the sawdust of criticism ; they have hunted ' documents ' until the word has become a joke. They have also, in an attempt at moral popularization, so overemphasized certain sides of the thinking and literature of the Hebrews, such as the prophets, that they have created the idea that there is nothing else worth while in the Old Testament than those prophets and people have become frankly bored with their monotony. They have also, in an attempt to be truly scientific and evolutionary, degraded the general picture of the God of the Hebrews into a grotesque parody, and the sublimity of Sinai and its thunders into a raree-show worked by priests. That the intellectual and religious phenomenon of the Hebrew race was as great a miracle in the history of the world as that Greek miracle of which we hear so much has been obscured to the point of vanishing."

And he adds a little further (p. 220):

" In older days among ourselves students were students of the whole Bible and were expected to know their Hebrew as well as their Greek. In the specialization of our day it is a rare theologian who can pass from the New Testament to the Old and use both at first-hand. And it is almost humorous how, in

consequence, outlying small fry of Essenes and Mandaeans are dragged in to explain phenomena in the New Testament, the source of which is plain in the Old. This will right itself in time, but the laughing Reason of the eighth chapter of Proverbs must be sore put to it to keep up her good humor with men when they persistently ignore her as the Logos of JOHN's Gospel and find that Logos in the entirely different Memra of PHILO. Even TERTULLIAN knew that JOHN's Logos was as much Reason, Strength, and Spirit as Word."

The whole book which is eminently readable is a vigorous plea to take the Old Testament at its face value and try to regard it as literature and read it as such. In a sense it is more modern than the New Testament, except the words of CHRIST himself. " The rest of the New Testament is theology, and some of it very ancient and moth-eaten theology, but the Old Testament is the very life and thinking of the whole of the Hebrew people and their life and their thinking, *sub specie eternitatis*, are exactly our own." (p. xxii.)

Dr. MACDONALD was exceedingly well prepared for his difficult task for to the traditional equipment of the theologians, he adds other tools, —equally valuable, such as a wide knowledge of folklore, of life in Syria to-day, of Arabic literature (which has continued on a larger scale some of the Hebrew traditions), of occultism and psychic research, not to speak of multifarious readings not all of which were along the conventional academic lines. This has enabled him to understand the Old Testament, more completely and with more humanity.

I shall not attempt to analyze his book, for it is meant to be read rather than dissected, but shall simply make a few remarks which suggested themselves to me while I enjoyed to the full the pleasure of reading it.

The book is not simply a study of the Old Testament, but as the title indicates, of the Hebrew genius, and it has helped me to understand that genius better. Of course, it does not succeed in explaining the Hebrew miracle—if it could be explained, the miracle would vanish—but it helped me to plunge myself more deeply into it. In his discussion of Hebrew philosophy (1), the author points out that it was Platonic rather than Aristotelian, an idea which had never occurred to me, but which I think is truly illuminating (p. 11-13, read the whole context).

His account of *The Hebrews in joyous song and dancing*, and of DAVID, was also very enlightening to me. The moot questions concerning DAVID's songs are not solved to be sure, but apt comparisons with the Arabic pre-Islamic poetry, e.g., with IMRU'UL-QAIS, quicken our appreciation.

Other Arabic comparisons are introduced in the two chapters on the

(1) I use the word " Hebrew," as the author does, with reference to the Old Testament, in contradistinction to " Jewish " which is more comprehensive.

prophets, yet I was surprised to find no reference to the discussion of prophecy by Muslim theologians. The fact of prophecy is much closer to them than it can possibly be to us, and their reaction to it very instructive. There is an excellent account of the subject in the Risālatu-t-tawḥīd of MUḤAMMAD 'ABDU (2).

On the ground that Semitic inscriptions can be traced back to the thirteenth century, the author concludes (p. 88) that at the time of the composition of the Old Testament the Hebrew had been living for centuries in a writing age. Assuming that JEREMIAH and JOEL wrote or dictated it does not follow that much writing was done before their time. One can easily conceive early writings as restricted to monumental or other exceptional purposes. On the other hand the memory of people was far more capacious and faithful in the agraphic ages; I do not think that those people had a better memory than we have, but they used theirs differently,—for the actual preservation of texts rather than for reference only, as we do.

The author's treatment of Hebrew stories is full of valuable suggestions, and this is natural enough considering his familiarity with the Arabic stories and particularly with the *Alf laila wa-laila*. My only regret is that he is not so well acquainted with the Egyptian stories. His account of *Genesis* is thoroughly delightful. I cannot resist the temptation of giving you a sample of it (p. 96) :

> " *Genesis* stands apart not only in the literature of the Hebrews but in the entire literature of the world. It is safe to say that there is no other book which combines as it does a philosophical study of the fundamental institutes of human life, a psychological study of a family of marked characteristics, developing into a people equally marked, and a political and economic study of that people over against the rest of the world, personified in the great figure of an adventurer of their race; the whole told in clear, objective stories which can be the delight of children, yet with a depth of sheer thought behind them which has stirred and led the thinking of the world more deeply than have the speculations of PLATO."

The writer of *Genesis*, Dr. MACDONALD notes (p. 107), had no word for " conscience," and he had to invent the phrase " knowing good and evil." It is noteworthy, I would add, that the Egyptians had such a word, *maā-t* (3)—and it occurred already in texts of the Vth Dynasty, if not in earlier ones—that is, some two thousand years before the earliest Hebrew writings (and of course the *Genesis* is a rather late portion of

(2) In my edition—the sixth revised edition, Cairo, 1351— p. 83 ff. Dr. MACDONALD knows that work for he kindly reviewed a French translation of it for *Isis* (Paris, 1925; *Isis*, 9, 456-7).

(3) Sir E. A. WALLIS BUDGE : *Egyptian Hieroglyphic dictionary* (London, 1920, 271).

the Old Testament and not an early one as its place at the beginning of it would suggest).

The book concludes naturally with a study of *Ecclesiastes*, which was one of the latest manifestations of the Old Testament genius. The presence of that book in both the Jewish and the Christian canons is astonishing, and can only be explained by the author's reiteration of the fear of God; however, his canonization " would have infinitely tickled ECCLESIASTES himself " (p. 215).

My only disagreement with Dr. MACDONALD concerns his savage onslaught on Egyptian and Babylonian literature (p. 218). I do not think it is justified. I suspect that he knows them only—as most scholars do—as they appeared in the memoirs of learned societies, each text being so overladen with brackets, parentheses, asterisks, diacritical signs, footnotes and appendages, that whatever literary value it may possess is utterly lost. Often the editor is so pedantic and so little susceptible to literary grace that he does not see the text in its original beauty, and unwittingly spoils or even destroys its form and style. What would we think of the Old Testament if we knew it, not in the Authorized Version —which is almost as marvelous as the Hebrew original—but only in fragments edited by graceless pedants? Dr. MACDONALD has such a fine feeling for style that if he read (4) some of the Egyptian and Babylonian texts *as literature*—that is, if he read them as he asks us to read the Bible—he would no longer be able to deny their merit. I would readily grant that the Hebrew literature is superior, as well as it is posterior, to them—though such comparisons are a little obnoxious to me. There is no more point in claiming that the *Song of songs* is superior to the Egyptian love songs, than in saying that AESCHYLOS is superior to SHAKESPEARE. Literary genius cannot be measured with a yardstick. We can recognize its presence—and we recognize it in many Egyptian works as obviously as in the Hebrew ones—but we cannot say exactly " there is so much or so much of it "—and why should we bother about that?

With this single restriction, one cannot be too grateful to Dr. MACDONALD, for his fresh interpretation of the Hebrew miracle and his vigorous defense of the Old Testament,—that extraordinary production of the most peculiar people. GEORGE SARTON.

Charles Cutler Torrey.—*The Jewish Foundation of Islam.* x+164 p. New York, Jewish Institute of Religion Press, 1933.

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(4) For example in T. E. PEET's excellent British Academy lectures (London, 1931; *Isis*, 21, 305-16).

This is easily the most important book on the problem of MUHAMMAD's environment and personality and of the origin of Islam and of the Koran that has appeared for some years. It is incisive, provocative and provoking, full of sweeping and dogmatic statements. This tone and attitude, with little doubt, are due to Professor TORREY's recognition that any attack on the present positions as to MUHAMMAD and his times must be expressed with positiveness and vigour. The convictions which have grown up in the last fifty years have become deeply entrenched and must be carried by storm.

Obviously a full discussion of Professor TORREY's views would be out of place here. No criticism, it may be said can lie against them as to breadth of knowledge or exactitude of scholarship; the future controversy—and it is certain to come—will be entirely as to the weighing of evidence and judging of probabilities. His main positions and their relation to one another may be stated thus. (1) There has always been a feeling among students of the rise of Islam that the presence of Jews in Arabia in historical times called for historical explanation. The Muslims themselves might take the Biblical tradition for granted and find it natural that beside the descendants of ISHMAEL there should be other descendants of ABRAHAM. Did ABRAHAM not build the Ka'ba? But modern students of history seek something more modern and precise. And so it came about that, long ago, DOZY built up an hypothesis of a Jewish settlement in Arabia even in the time of DAVID. That hypothesis was never accepted and the recoil from it was so strong that the Jewish influence on MUHAMMAD came to be minimized, as by WELLHAUSEN. It was also maintained that the Jews spoken of in the Qur'an must have been Arabs converted to Judaism, and no true Jews. Further that the dominant influence upon MUHAMMAD was Christian and not Jewish. Against all that Professor TORREY sets himself. The Jews of MUHAMMAD's time were true Jews; they were important both at Mecca and Medina; they were by far the dominant, if not the only real influence, upon MUHAMMAD. He can also date, and this is sound history, their entrance in large numbers into Arabia. In the middle of the sixth century B.C. the neo-Babylonian King NABONIDUS (555-538) transferred his residence to Teima, an important trading station in north Arabia with a remarkable water supply. Why NABONIDUS settled there we do not know but it is easy to see why Jewish colonies should have followed him. The temple at Jerusalem was destroyed in 586. Judea was laid waste and its inhabitants scattered. Professor TORREY sees some of them settling in Teima, going on south on the caravan route to Khaibar, then to Yathrib, called later Medina, and to Mecca. At all these places there are recorded Jewish settlements and this gives

a plausible explanation of their existence and means that they were no converted Arab tribes, but true Hebrews. In fact this explanation is more than plausible; it seems definitely sound. It explains also the curious occurence of the little group of so-called Lihyanic inscriptions, in an archaic south Arabian character, just south of Teima. That meant a migration from the Yemen like the Hebrew migration from Judea. The Jews, therefore, in northern Arabia, down as far as Mecca, can be held to have been old settlers in the land in MUHAMMAD's time with a definite Hebrew tradition behind them of learning, religion, law and custom. They would have their books, schools and rabbis. With this Professor TORREY has got his foundation.

But (ii) there were also admittedly Christians in Arabia. What part had they in the production of MUHAMMAD? WELLHAUSEN and many after him, ascribed to them a preponderant part. MUHAMMAD's theological guides, they held, had been heretical Christians, if much of his law was derived from the Jews. Again Professor TORREY is flatly in opposition. " There is no clear evidence that MUHAMMAD ever received anything directly from a Christian source." (p. 50). And this is reiterated again and again, pp. 55, 66 f., 73, 78 f. Even the stories of JOHN and of JESUS, the miraculous conception, birth, infancy, came to him from Jews. This is a hard saying. No one would ever maintain that MUHAMMAD's source was an orthodox Christian, but that a Jew would have told him any form of the story of the infancy is flatly incredible. Then (iii) was MUHAMMAD " unschooled," ignorant of reading and writing? That *'ummī* means " unlettered " may be frankly abandoned. It probably means simply " Gentile," the Hebrew *gōy*. But could MUHAMMAD read and write? This question ultimately goes far, for it involves the whole origin and structure of the Koran in its present form. Was MUHAMMAD himself responsible for that form? Did he with his own hand write it out, insert the so-called interpolations, finish it and leave it to be copied by amanuenses? So it is here held and it means that the whole Muslim account, so seemingly detailed and historical, of the gathering up of the Koran fragments, the fitting them together and building up into the form we know is like the story of how EZRA restored from memory the whole Hebrew Bible and " of like value for historical purposes." (p. 92). Again, we have a hard saying. It is perfectly true that we have often accepted too naively Muslim accounts of the beginnings of Islam and we have followed too simply the exegesis of the Arabic commentaries and so it is well, once in a while, to meet with an emphatic protest and denial. But surely the beginnings of Islam are in a clearer light of history than the age of EZRA. (iv) Professor TORREY makes no question of MUHAMMAD's sincerity but he doubts

his simplicity. He recognizes his auto-hypnosis and might have gone further on his automatisms. And we can agree, too, as to his long-headed political sagacity. Mystics, for all their visions and voices, have often been very practical people. But when Professor TORREY (v) rejects flatly SNOUCK HURGRONJE's hypothesis as to MUHAMMAD's late connecting of ABRAHAM and ISHMAEL with the Ka'ba—that it was only after he had left Mecca that ISHMAEL entered the picture as the ancestor of the Arabs —there is certain to be acrid controversy and flat contradiction. Unhappily the question is connected with interpolations in the Meccan chapters of the Koran and meets therefore Professor TORREY's primary position that we have the Koran as it, literally, left MUHAMMAD's hand and that it is no thing of shreds and patches. For him the association of ABRAHAM and ISHMAEL with the sanctuary at Mecca is pre-Islamic (p. 91) and those who have steeped themselves in Muslim ideas cannot but have some sympathy with that view. There is a good deal of revolt, also, against the application of arbitrary methods on hypothetical grounds to so venerable a text as that of the Koran. This may be a bit of pathetic fallacy but the revolt is real. Finally (vi) Professor TORREY connects the term *Islam* itself with the submission of ABRAHAM and ISHMAEL to the divine command to sacrifice ISHMAEL. For him, that is, ABRAHAM and ISHMAEL and the whole Jewish connection were fundamental to Islam.

And now, to speak profanely, the fight will be on as to the whole beginning of Islam. And it narrows down to this : Is Islam a Jewish or a Christian heresy? The present reviewer has much sympathy with many of Professor TORREY's positions, but he, as he sees it now, is on the Christian side.

(Hartford, Connecticut.) D. B. MACDONALD.

Sir Arthur Eddington.—*The Expanding Universe.* VIII+182 p. The Macmillan Co., New York, 1933. (Price $2.00.)

Here we find a book as fascinating as any fiction and, alas, one which contains much that future explorations into the unknown universe may, perhaps, reveal as fiction. This the author realizes as fully as any one, but Dr. EDDINGTON possesses that daring of genius which permits him to indulge in extrapolations far beyond the range of actual data which suggest them. In his introduction he says that his main inquiry is into the nature of the *cosmical constant* and this investigation appears to be so suggestive that " we appear to be closing down on the capture of the most elusive constant of nature."

The book contains four chapters with titles as follows : The Recession of the Galaxies; Spherical Space; Features of the Expanding Universe;

The Universe and the Atom. It is written in the rich and inimitable style of Dr. EDDINGTON, replete with those happy turns of language which are too infrequently found in scientific writing. The reader must be warned, however, that in spite of the apparent simplicity of the story which is unfolded and the masterly way in which it is told, the actual situation is one of great complexity. It is doubtful whether the arguments can be appreciated even in outline without the use of much mathematical language. A few formulas do slip into the text, but these are introduced so casually that the reader may be led into believing that he understands them.

The main thesis of the book is contained in the last chapter, where the author plays with the tantalizing problem of associating the size of the electron with the radius of curvature of space. In order that we may appreciate the beauty of this concept, we shall epitomize the situation.

Let us recognize that there are three phases in the development of the theory of relativity. The first of these is generally referred to as the *special theory* of relativity, which is essentially an interpretation of the celebrated LORENTZ transformations of space-time. This theory is now almost universally accepted. The second is *Einstein's theory of gravitation*, which expresses gravitational potentials in terms of the coefficients of a quadratic form in four variables, three associated with space and the fourth with time. This theory rests upon experimental evidence concerned (*a*) with the bending of light by the sun, (*b*) with the perihelion shift of the planet Mercury, and (*c*) with the shifting toward the red of the spectra of heavy stars. The third phase, the *theory of cosmic relativity*, is associated with the form which the gravitational potentials have at great distances from us and the consequent interpretation of our assumptions. This theory is naturally in great flux and it is for its elucidation that the present volume has been prepared.

The experimental evidence upon which the cosmic theory rests is extremely simple. Only one outstanding fact presents itself for explanation. This is associated with the motion of the spiral nebulas, those vast assemblages of stars of which perhaps a million have been discovered beyond the bounds of our own galaxy. By methods involving the greatest ingenuity the radial velocities of some of these objects have been determined and the astonishing fact detected that the nebulas are all (with a minor exception or two) *receding from us*. More astonishing even than this is the fact that the more distant they are, the more rapidly they recede. Caution must be urged in the use of the word *recede*, however, since the experimental evidence is merely a spectrum in which the lines from the nebula are seen to be shifted toward the red when they are compared with the same lines in the solar or terrestrial spectrum.

This change in position is called a *Doppler shift* and is interpreted as a measure of radial recession when found in not too distant stars. This interpretation is subject to some suspicion, however, since the DOPPLER shift is predicted by EINSTEIN's theory of gravitation for the spectrum of a star of great density, of which the white dwarf companion of Sirius is an unusual example.

Two alternatives are presented in the cosmic theory as an explanation of the DOPPLER shift of the nebulas. The first of these is that the shift is a function of the space-time metric and is a *spurious recession* in the sense of ordinary Euclidean space. The second alternative postulates a genuine Euclidean recession and leads to the proposition that the matter of the universe is *expanding into space*. The first interpretation follows as a direct consequence of EINSTEIN's celebrated law of gravitation, $G_{mn} = \lambda g_{mn}$, where λ is the *cosmical constant*. The introduction of this cosmical constant led to the discovery of two closed spherical universes both static and unchanging with time. One of these was discovered by EINSTEIN and the other by DE SITTER, the latter having somewhat the better position on account of its prediction of the apparent recession of remote objects. But objections arose to both solutions, which EDDINGTON has summed up in the statement " that EINSTEIN's universe contains matter but no motion and DE SITTER's contains motion but no matter. It is clear that the actual universe containing both matter and motion does not correspond exactly to either of these abstract models. The only question is, which is the better choice for a first approximation? Shall we put a little motion into EINSTEIN's world of inert matter, or shall we put a little matter into DE SITTER's *Primum Mobile?* "

An answer to this question was given by A. FRIEDMANN in 1922 and independently by Abbé G. LEMAITRE in 1927, who introduced the concept of non-static universes intermediate between the static solutions of EINSTEIN and DE SITTER. That is to say, the actual universe is envisaged as one containing both matter and motion and hence having a radius of curvature which changes with time. Since the velocities of the spiral nebulas are recessive, one is led to the conclusion that the radius of curvature is increasing and hence that the universe is expanding. From the measurements of V. M. SLIPHER and E. P. HUBBLE the speed of recession has been estimated by EDDINGTON to be approximately 550 km. per megaparsec (1 megaparsec = 3.26 million light years). Since the speed of recession is thus a linear function of the distance, the recently discovered nebula in the constellation Gemini with a recessive velocity of 25.000 km. per second may be estimated to be about 150 million light years from us.

Reflecting upon these matters, the author turned his attention to

the reason why two pure numbers should exist among the physical constants. One of these is a number of the order of 10^{79}, which represents the estimated number of electrons in the universe; the other is 137, the fine structure constant, associated with the wave theory of the electron. By arguments of the greatest ingenuity the author related these constant by means of the following equation :

$$\frac{136 m_e \, m_p}{m_e + m_p} = \frac{\sqrt{N}}{R}$$

where m_e and m_p are the masses of the electron and proton respectively, N the number of electrons in the universe, and R the radius of curvature of space, which is associated with the cosmical constant by the equation, $\lambda = 3/R^2$. The number 136 is the fine structure constant reduced by unity for reasons advanced by the author. This equation is the fundamental contribution of the book.

The delightful way in which difficult questions are presented is illustrated by the problem of the fate of light in an expanding universe. As is well known the " ghost star " theory of EINSTEIN assumes that light can pass around the universe, but the " wall of time " theory of DE SITTER asserts that a barrier exists for such a circuit. Hence, in the process of expansion, a point must be reached where the transition from one state to the other must take place. Thus EDDINGTON says : " In the earliest days, when the universe was only just disturbed from equilibrium and the rate of expansion was slow, light and other radiation went round and round the universe until it was absorbed. This merry-go-round lasted until the universe had expanded to 1.003 times its initial radius. Then the bell rang for the last lap; light waves then running will make just one more circuit during the rest of eternity; those which started later will never get round." EDDINGTON puts the critical radius (the beginning of " the last half-lap ") at 1.073 of the initial radius. He describes the situation thus : " Our expanding universe is an expanding bubble. It seems fair to say that when the expansion reached 1.073 the *bubble burst*. For regions between which no causal influence can ever pass are as disconnected as the fragments of a bubble."

It seems unfortunate that this book was not written a few months later so that it might include a more extensive account of the theory recently advanced by E. A. MILNE (World-Structure and the Expansion of the Universe, *Zeitschrift für Astrophysik*, vol. 6, 1933, pp. 1-95). The original suggestions of MILNE, which had appeared in a few notes prior to the publication of the volume under review, are referred to by the author, but dismissed more casually than they seem to deserve.

As will be apparent, however, the reviewer feels that the present

volume contains much that is stimulating to the imagination and paints a picture of the present status of a problem in cosmic physics which may give us deeper insight into the nature of the mysterious universe than we have ever had.

Indiana University. H. T. DAVIS.

Sir James Jeans.—*The New Background of Science.* VIII+301 p. The Macmillan Co., 1933. (Price $ 2.50.)

It is astonishing to observe the remarkable transformation which the new physics has effected in the point of view of modern scientists. We seem to have moved from the mechanistic philosophy of the age of Lord KELVIN into an almost complete subjectivity. "We may distinguish three broad epochs (in science)," says the author of the book under review, " the nature of which may be suggested by the words animistic, mechanical, and mathematical." Shaken by the theory of relativity, the strongholds of those who would view nature as an assemblage of atoms driven by immutable laws capable of rationalization by mechanical models, have at last fallen before the revelations of the quantum theory. Nature is not what we have always thought her to be; her curious surprises, —corpuscles with the attributes of waves, undulations that go about in discret packages,—have driven explanation away from all mechanical concepts into mathematical formulas. The present volume, written with the masterful touch of Sir JAMES JEANS, who has been upon the forefront of mathematical physics and astrophysics for these many years, tells the story of how this transformation has come about and what the present status of the problem is.

Speaking of the personal element which has entered the picture of nature the author says : " Trying to observe the inner workings of an atom is like plucking the wings off a butterfly to see how it flies, or like taking poison to discover the consequences. Each observation destroys the bit of universe observed, and so supplies knowledge only of a universe which has already become past history... The whole of nature follows us about... This is not meant in any way to suggest that an objective nature does not exist, but merely that it is at present beyond our purview. We can only see nature blurred by the clouds of dust which we ourselves make; we can still only see the rainbow, but a sun of some sort must exist to produce the light by which we see it."

The book is divided into seven chapters with titles as follows : The Approach of the External World; The Methods of Science; Framework of the External World—Space and Time; Mechanism; The Texture of the External World—Matter and Radiation; Wave Mechanics; Indeterminacy; Events. The thesis is skillfully developed through these

chapters that man cannot know nature with certainty, that knowledge is all relative in the sense that it consists of sets of probabilities about which we find the penumbra of the probable errors. The author admits the constant growth of knowledge, however, and illustrates this with historical examples. Our elementary knowledge of matter affirmed that matter was solid; today the probabilities point to the conclusion that matter is so nearly space that if the electric forces between its particles could be abolished " we could pack all the particles of a ton of bricks within a cubic inch of space." One leaves the book with the feeling that science is no longer sure of anything except its experimental data and that nature appears more inscrutable today than it has perhaps ever appeared in the history of thought.

The chapter on relativity is well done, but requires some formulas for its elucidation. The author has not hesitated to introduce mathematical expressions where they seem essential to the clear understanding of the argument. This may give a forbidding appearance to some of the pages for the non-mathematical reader, but the discussion and illustrations are so clearly developed that no one should have essential difficulty in understanding the conclusions. The gravitational and cosmic theories of relativity are skillfully done, one particularly pleasing illustration being introduced through the trace which a geodesic on our spherical earth makes in the flat map obtained by a MERCATOR projection. " Just as the friend of the flat-earth heretic was able to show him a curved surface—in this case a sphere—in which all his complicated curves became shortest courses, so EINSTEIN has shown the scientific world a curved continuum in which the complicated tracks of planets, cricket balls, rays of light, and so forth, all reduce to shortest courses."

It is interesting to see the present position that JEANS takes with regard to certain questions. The author was one of those most active in exploring the concept of the ether about which he wrote in 1914 (Report on Radiation and the Quantum Theory), " whatever is regarded as certain or uncertain about the ether, it must be granted as quite certain that it approaches more closely to a continuous medium than a gas." The author now believes that the existence of the ether is no longer a problem of modern science. The theory of relativity and the theory of the quantum have entirely disposed of it. " *A priori*, ... there are very great odds against our being able to form any kind of a visual picture of the fundamental processes of nature." The ether was one of these attempts and hence doomed to inevitable failure. Discussing the controversial question about the expanding universe the author urges caution in accepting the recessive velocities of the spiral nebulas as real. He points out an essential conflict between the proponents of the expanding universe,

in which the velocities are assumed to be real, and those who have estimated the age of the universe. He summarizes his objection in the statement: „ It is exceedingly difficult—although perhaps not absolutely impossible—to imagine that the universe can have been evolving ten or a hundred times longer than space has been expanding."

Perhaps the most important contribution made by the book is its lucid rationalization of the quantum theory. The author finds a complete indeterminism at the basis of nature. " We cannot foretell the future because we can never know the present with complete certainty." How, then, does the determinacy enter into molar physics? Why do we get diffraction patterns from the behaviour of photons, the activity of which is completely indeterminant within a space-velocity rectangle of the order of PLANCK's constant? The answer to these questions is strikingly given by the author as follows: " In the mathematical problem known as the ' random walk,' we imagine that a traveller walks 20 miles a day, but with no causal relation between the directions of his walk on successive days... A mathematical formula can of course be obtained to exhibit the chances of his being at various points at successive nightfalls. If we now reduce the unit of time from a day to a second, so that his every step is indeterminate, we find that the probabilities spread out in waves much as SCHRÖDINGER's equation; the spread of the waves conforms to a strict determinism, although the underlying physical cause is a complete indeterminism."

The book concludes with a summary on *events*. The law of entropy is introduced and the author reflects upon the suggestive evasion of this law which is found in the concept of " MAXWELL's demon." Most suggestive is the sentence: " It would seem reasonable to define life as being characterized by a capacity for evading this law." The connection of the individual with the entire pattern, an idea which runs as a thread throughout the book, is finally summarized.

As will be apparent, the reviewer has found this book a stimulating picture of the state of modern physical science, its achievements, and its hopes.

Indiana University. H. T. DAVIS.

H. Lévy.—*The Universe of Science.* XIII+224 p. The Century Co., London and New York, 1933. (Price $2.00.)

Dr. LEVY, professor of mathematics at the University of London, has written a stimulating volume for those who would question the methods and motives of modern science. As a professor of mathematics the author might be expected to herald with complete approval the overwhelming encroachment of mathematics upon the field of natural

science. His belief is otherwise and we find him stating in his introduction the caution : " The assertion of contemporary scientists, who state that the Universe is a fickle collection of indeterminant happenings, and a great thought in the Mind of its Architect, a Pure Mathematician, serves merely to divert the activity of the scientific brain from its concentration on the contradictions and confusions of the all too real outward world to a state of passive and unreal contemplation."

The main thread of the present volume is found in its point of view with reference to the relationship of science and scientific method to society as a whole. Science, in the opinion of the author, deals with *isolates*. An attribute of a certain kind of material is to be studied. Other attributes must be removed from the experiment or made "neutral." This, he asserts, is the keynote of the scientific method. Society, on the other hand, is never isolated in the strict scientific sense and hence the conclusion is reached that " if the scientific movement is to be appreciated for what it is, it is essential that its isolates, artificially introduced to allow of neutral study, must be ultimately removed."

The book is brief, consisting of five chapters, the titles of which epitomize the contents : The Changing Pattern; Unpicking the Threads : The Process of Isolation ; The Queen of the sciences—Mathematics ; Scientific Determinism; Science—A Social Adventure.

Sketching his main thesis in the first two chapters, the author turns to mathematics for his example of the isolate of science. " Pure Mathematics is the method of isolation raised to a fine art. Its most fundamental concept is that of number. Not three apples, three lives, or three ideas, but simply *three* isolated from the subject of reference and written 3". In this chapter the author traces some of the main threads of mathematical reasoning. He illuminates the ideas of generalization and induction. One of his most pleasing illustrations is the derivation of the imaginary number by isolating the concept of rotation out of the physical rotation of an object. He calls attention to the importance of *operators* and *operational equations* in mathematical physics and shows that these are merely isolates derived from an observation of nature itself.

In discussing determinism Dr. Levy inclines to belief in a fundamental determinism in nature. This determinism is synonymous with the ability of science to explain and to predict. " The only test we can apply... of the validity of determinism is that involved in the possibility of framing laws that provide accurate explanations and predictions of facts discovered independently of those upon which the laws are based." In the attempts of those who seek to find a fundamental determinism at the root of the universe he sees merely a reaction from the mechanistic view of an earlier age. What this may affirm regarding the freedom of human will

he is unwilling to state since science has not yet succeeded in constructing this isolate.

Perhaps the book is best summarized in the following single quotation: "Science is frequently stated as being entirely a matter of measurement. This is false. The scientific movement is itself an isolate of society. It approaches the universe in which it finds itself not as a completely dissociated venture restricting itself to a fictitious world of its own creation, but as a corporate search for such aspects of the world as it is capable of neutrally isolating with the weapons of investigation it has at its command."

(Indiana University.) H. T. DAVIS.

Harold T. Davis.—*Tables of the higher mathematical functions, computed and compiled under the direction of* HAROLD T. DAVIS, *Indiana University and the Cowles commission for research in economics.* Volume I published as a contribution of the Waterman Institute for scientific research, Indiana University. XIII+377 p., 2 pl. Bloomington, Indiana, Principia Press, 1933. ($ 6.50.)

Though my opportunities of using them are very limited, I have a great fondness for scientific tables, each of which is the synthesis of a great variety and abundance of efforts. It was my privilege to discuss this matter in the very first volume of *Isis* (p. 498-500) apropos of the splendid *Recueil de constantes physiques* edited by HENRI ABRAHAM et PAUL SACERDOTE (Paris, 1913) and of the second volume of CH. MARIE's *Tables annuelles de constantes et données numériques* (Paris, 1913), which have by this time developed into a very impressive collection. In another volume (5, 566) I was able to speak of the excellent *United States Life tables* edited by JAMES W. GLOVER (Washington, 1921). The famous KELVIN saying which DAVIS has put at the head of his preface—"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind—" would perhaps be more strictly applicable to physical tables, but it is not altogether inappropriate here, for mathematical tables would not be compiled except for their physical applications. However, mathematical tables are essentially different from the physical ones: the latter represent the results of experiments and this remains true irrespective of the amount of mathematical elaboration of the original measurements; the former on the contrary are independent of every contingency except the fundamental constitution of nature and of our own mind, and a few arbitrary conventions. For example the multiplication table and the gamma table are

independent of temporal or spatial accidents but they are naturally dependent on our numerical conventions. Physical tables are subject to continuous change and improvement; mathematical ones are theoretically absolute.

According to his temperament each scientist will prefer the one or the other, but aside from the philosophical questions involved, historians will probably have more respect for the mathematical tables because of their greater antiquity. Not to speak of the Babylonian tables which are forty centuries old and of the Egyptian ones which are somewhat younger (but are probably derived from a much older prototype), PTOLEMY's table of chords, the direct ancestor of our trigonometric tables, dates back to the middle of the second century. By the way, it is interesting to recall that PTOLEMY's table—which the average mathematician would consider a monument of hoary antiquity—stands about half-way between the Babylonian or Egyptian tables and those of our own time! This may help him realize once more that Greek science was not a beginning but the climax of a long evolution.

Ignorant humanists may imagine that the compiler of mathematical tables—even of the higher mathematical functions—must be dull and uninspired, but our readers know better, because they have probably read the author's wise book *Philosophy and modern science* (1931; *Isis*, 18, 204-6) and almost certainly his excellent reviews of other books of the same kind in *Isis*. Indeed he is very conscious of the historical background of his tables and of their philosophical implications, and they fully deserve to be reviewed in *Isis* on that account if on no other.

Although the bulk of the present volume is not meant to be read, let me say that there are in it at least a hundred pages which are very readable. The author does not attempt to write a history of the classical functions and their applications, which would involve a wide cross section throughout the whole of mathematics, but after a brief sketch of the gigantic evolution which led from the ordinary polynomials to, say, the HERMITE and LEGENDRE ones, he gives us an interesting classification of scientific tables, which I beg leave to reproduce in abbreviated form:

A. Arithmetical, B. T. of powers, C. Logarithms, D. Circulars functions, E. Hyperbolic and exponential functions, F. Theory of numbers, G. For the solution of equations, H. Statistical t., I. Mathematical constants, J. Higher mathematical functions, K. Integral t., L. Commercial t., M. Actuarial t., N. Engineering, O. Astronomical t., P. Physical t., Q. Chemical t., R. Navigation.

This classification might be criticized on logical grounds, for example, it would have been better to make a sharper distinction between the purely mathematical tables (A to K) and the others which are syntheses

of an absolutely different kind, but it will answer its practical purpose.

Let us reproduce also the subdivisions of section J as this will give us an idea of the magnitude and contents, if not of the order, of the present work : 1. BERNOULLI polynomials. 2. BESSEL functions. 3. Beta function. 4. The confluent hypergeometric function. 5. Elliptic functions. 6. Elliptic integrals. 7. The error function and related functions. 8. EULER polynomials. 9. FRESNEL integrals. 10. Gamma function. 11. HERMITE polynomials. 12. LEGENDRE polynomials. 13. Lemniscate functions. 14. LOMMEL functions. 15. LOMMEL-WEBER functions. 16. Miscellaneous functions defined by integrals. 17. PEARSON's integral and related functions. 18. Psi function and its derivatives. 19. Sine, cosine, exponential and logarithmic integrals. 20. Theta functions. 21. The Zeta function (The present volume 1 contains only sections 10 and 18).

After this follows a history of early tables, which is especially instructive, because it is informed with the author's practical experience. For example, he takes pains to explain how PTOLEMY tables were actually computed. By the way a facsimile of a page of the table of chords taken from GRYNAEUS' *Almagest* of 1538 forms a very appropriate frontispiece, and illustrates discreetly at the very threshold of his work the author's humanistic intention. After PTOLEMY, he deals with the Indian and Arabic tables, and with the astounding computational activity which was one of the characteristics of the last pre-logarithmic century. The rest of the historical introduction (p. 24-40) is devoted to the logarithmic tables : NAPIER, BÜRGI, BRIGGS, and later.

Part II and III are more technical and less historical, and yet the author is so careful in the establishment of chronological sequences and the indication of his sources that they deserve to arrest the historian's attention (when a man is historically minded, as DAVIS obviously is, and sufficiently conscious of historical niceties and difficulties, every writing of his is to some extent a historical contribution). A discussion of details is out of the question in this place, but it is well to state their contents.

Part II. *Modern mathematical instruments of calculation.* 1. The theorem of TAYLOR; 2. The process of continuation; 3. BOREL's method of continuation; 4. LAURENT series; 5. Asymptotic series; 6. The method of saddle points or the method of steepest descent; 7. The method of DARBOUX; 8. The asymptotic expansion of functions defined by TAYLOR's series; 9. Generalizations and bibliography.

Part III. *Interpolation and its uses.* 1. The computation of function tables; 2. The GREGORY-NEWTON formula for interpolation; 3. The NEWTON-STIRLING interpolation formula; 4. The NEWTON-BESSEL interpolation formula; 5. EVERETT's method of interpolation; 6. Derivatives of tabulated functions; 7. Higher derivatives of tabulated functions; 8. Inverse interpolation; 9. Integration of tabulated functions

and the summation of series; 10. Subtabulation; 11. Interpolation for functions of two variables.

A remark concerning asymptotic series (p. 51) may be quoted " The aims of mathematicians and the aims of those who employ series for computation in such fields as astronomy, physics etc., are often diametrically opposed. The attention of the former is most frequently addressed to the problem of convergence, the last terms of a series being far more important than any finite number of the first. A celebrated example of this is due to P. DU BOIS-REYMOND (1831-1889) who constructed a series which converged so slowly that it would require a number of terms equal to the volume of the earth expressed in cubic millimeters in order to obtain one-half the sum of the series. On the other hand, astronomers, physicists and other applied workers seek series whose first few terms converge rapidly to the desired values. Whether the series ultimately diverge or converge is a matter of no special consequence. An interesting example of this was encountered by the writer in connection with a problem involving the LOMMEL function..."

Part IV contains eight interpolation tables, and Part V an abundant bibliography (p. 144-76) which as far as I could judge by means of a few trials was compiled with great care. This ends the prolegomena which cover 165 pages.

The present volume contains tables of the gamma and of the psi (or digamma) function. The former was defined by EULER as follows :

$$\Gamma(x) = \int_0^\infty e^{-t}\, t^{x-1}\, dt, \qquad R(x) > 0.$$

The psi function is the derivative of $\log \Gamma(x)$.

$$\Psi(x) = d \log \Gamma(x) / dx = \Gamma'(x) / \Gamma(x).$$

The first extensive tables of both functions were published by GAUSS in 1813. DAVIS' tables are preceded in each case by a mathematical and historical introduction. Each of these special introductions covers about fifteen pages and contains the essential information : definition, properties, developments, computation of the tables, their origin, bibliography. As to the tables themselves which are the very marrow of this work it is impossible to judge without painful verifications but the work was admirably planned out and the careful and generous efforts of many assistants (twenty are mentioned on the title page) were controlled by a whole series of checks and counterchecks. I much hope that the main author and director may live to see the successful completion of this great work for which he has already earned the gratitude of every mathematician.

The book is beautifully got up and the elegant printing is a credit

to the Principia Press which has already put itself within two years in the front rank of American presses.

GEORGE SARTON.

T. A. Rickard.—*Man and metals.* A history of mining in relation to the development of civilization. 2 vols. XIII+1068 p., 108 fig. New York, Whittlesey House, McGRAW-HILL, 1932.

The publication of this work is very welcome and will fulfill the expectations of readers whose appetite for it had already been whetted by various extracts published by the Royal Institution of Cornwall, the Institution of mining and metallurgy, the Iron and steel institute and the Institute of metals. Strangely enough the writing of it was suggested to the author by the " *Outline of history* " of his former classmate H. G. WELLS (they sat together at the feet of THOMAS HENRY HUXLEY). Dr. RICKARD, who is a mining engineer, found that WELLS " omitted to pay proper regard to the part that mining has played in the development of civilization."

In his *Introduction* the author defines carefully his subject and discusses civilization and progress. He remarks incidentally (p. 20) " The idea of progress is comparatively modern; it is peculiarly the impulsion of our own time. The ancients looked backward, we look forward." This is true, with one outstanding exception, that of SENECA, who understood the meaning of progress and understood it better than most of our contemporaries : he did not confuse the progress of knowledge with the progress of mankind (1).

The second chapter entitled *The ages without metal* is in effect an excellent summary of prehistory and one wonders at the amount of information which the author has been able to pack within sixty short pages. It is clear that the public he had in mind was largely men of his own profession for whom his work would be a kind of humanistic initiation. From another point of view much of what he says might be considered irrelevant, for the average person would not think of turning to a history of mining for information on DUBOIS' *Pithecanthropus*, the paintings of Altamira, or the pile-dwellings of Lake Constance. His accounts of Neolithic flint mines and of Indian paint mines in Missouri are more to the point. Each chapter is followed by a bibliography—for example this particuliar one includes 73 items on prehistory—but there are exceedingly few footnotes, hence the author's statements are referred to their sources only *grosso modo*.

Chapter 3 deals with *The early use of the metals* and brings us more

(1) See my *Introduction* (vol. 1, 248; vol. 2, 484).

fully into the subject. The author's excellent equipment for his task appears more clearly as we go on; it is due to the depth and length of his technical experience. It makes us realize that it is easier after all for an intelligent and well educated mining engineer to learn history than for a historian or philologist to acquaint himself with mining realities. The latter is often in danger of applying considerable learning to subjects the essence of which he fails to apprehend, to things which " are not so."

The first volume contains six more chapters : 4. *The gold and copper mines of ancient Egyptians;* 5. *The Phoenician metal-merchants;* 6. *The Cassiterides, or Tin Islands;* 7. *The Athenians and their silver mines;* 8. *The mines of the Romans in Spain and Italy;* 9. *The lead mines of the Romans in Britain.*

These titles are sufficiently clear to require commentary. They show that this first volume covers the history of mining in ancient times, moot questions such as that of the Tin Islands being fully and ably discussed. In fact each of these chapters is so full that it would be impossible to summarize them without extending this review inordinately.

The second volume pleased me less and I could not help wondering whether the author when he had completed the first one did not become impatient with his growing task and did not suddenly and ruthlessly decide to cut it short. It is divided as follows : 10. *Mining in medieval times;* 11. *The law of mines and the freedom of the miner;* 12. *The Conquistadores;* 13. *The later Argonauts;* 14. *The use of coal in the world's workshop;* 15. *The first use of iron;* 16. *Iron in human industry;* 17. *The miner in Southern Africa;* 18. *The romance of modern mining. Epilogue. Index.*

Chapter 10 is supposed to cover the whole of mediaeval history in hardly more than sixty short pages ! This is entirely out of proportion with the earlier chapters wherein the same amount of space is devoted to the study of a single question such as Phoenician metal trade, the Cassiterides, or Roman lead. And mind you, for the author the Middle Ages extend all the way from the barbarian invasions to the end of the sixteenth century and even later. This I must confess disappointed me very much, for I am well aware (see *Isis, passim*) that an abundance of documents on mediaeval mining is already available (though widely dispersed) and I had been looking forward to the publication of RICKARD's book with the secret hope of finding in it a good summary of the subject. The chapter, meager as it is, is interesting enough, but far below the high level of the first volume. The author has given us a very good summary of our knowledge of ancient mining, but the history of mediaeval mining remains to be written.

It is true there is a certain amount of mediaeval information in the

following chapter devoted to *The law of mines and the freedom of the miner*, which is a cross section throughout the ages down to yesterday. Chapter 12, *The conquistadores*, deals mainly with the Spanish conquests, but out of its 70 pages only a small portion concern mining proper. Chapter 13, *Later argonauts*, is an account of the great Californian adventure. It will suffice to mention the last four chapters and this has been done above.

These two volumes are not a history of mining but a selection of chapters of that history, the ancient period being treated with special fulness. It would be difficult to deduct from them a history of the progress of mining and metallurgy : they contain very valuable materials for such a history, but not enough to evidence its superficial and temporary discontinuities and its fundamental continuity. In spite of that *Man and metals* is a valuable work containing a rich collection of facts, far richer than its meager index would suggest. Let us hope that the author may be persuaded to write other chapters which would gradually complete this splendid outline. GEORGE SARTON.

R. R. Marett.—*Sacraments of Simple Folk.* 230 pp. New York, Oxford University Press, (Oxford, Clarendon Press), 1933. ($ 3.75.)

Defining as a sacrament " any rite which by way of sanction or positive blessing invests a natural function with a supernatural authority of its own," Dr. MARETT discusses the rituals that cluster about such primitive activities as Eating, Fighting, Healing, Dying, to quote a few of his chapter headings. Any one of these topics might easily precipitate hundreds of pages, and the author's purpose is of course to suggest rather than to prove, to sketch in bold outline rather than to paint in detail. In his bold effort to penetrate the subtler aspects of savage mentality he is guided by an optimistic but far from maudlin philosophy. Where so wide a range is covered, there must inevitably be room for dissent. But on virtually all general points of primitive psychology I feel that the author displays remarkable sanity and that in addressing himself to a wider public he is doing more than his bit toward destroying deeprooted misconceptions. He brings out the fact of leadership on even primitive levels (p. 16) ; he reiterates a view of magic that has always appealed to me as much closer to the truth than Sir JAMES GEORGE FRAZER's (p. 35) ; he deprecates rationalism as a motive of early marriage regulation and refuses to explain it by falling back on " instinct, that last refuge of the psychologically destitute " (p. 71). What Dr. MARETT says about fetichism (p. 146), the distinction between communism and collectivism (p. 161), and the essential sincerity of

medicine-men (p. 197) likewise carries immediate conviction. Altogether one can only regret that a thinker at once so admirably poised and so sympathetic with aboriginal aspirations should have had no opportunity to enrich ethnographic literature with the reports of independent field work.

(*Berkeley, Calif.*) ROBERT H. LOWIE.

Henry E. Sigerist.—*Man and Medicine. An Introduction to Medical Knowledge*. Translated by MARGARET GALT BOISE. Introduction by Dr. WILLIAM H. WELCH. x+340 p. New York, W. W. NORTON, 1932. ($ 4.00)

This is a translation of Dr. SIGERIST's " Einführung in die Medizin." Dr. SIGERIST, Professor at the University of Leipzig when this was written, is now Professor of the History of Medicine at Johns Hopkins University. It is not a history of medicine in the usual sense but was designed for the beginning student of medicine to tell him something of the background of the studies on which he is embarking. The plan of the book follows very closely the scheme of the medical curriculum, tracing the development of the various subjects. Such a method enables the author to show the important influence of historical and cultural movements on medicine in its various periods. He has done this in a delightful, informal way and the work should interest the general reader. As Dr. WELCH, in his introduction, says :

" I know of no other work covering in its entirety the same broad field, certainly none combining in equal degree complete command of the history of medicine with full knowledge of the present state of the science and art of medicine and with penetrating insight into the past and present social, cultural and philosophical bearings of the doctrines and practices of the healing art."

Important to scholars is Dr. SIGERIST's interpretation of certain phases of medical history and especially of the significance of modern work, since he often has an unique point of view. A striking example of this is the way in which he relates the work of HARVEY to the artistic ideals of the period. He compares him to the Baroque artist, who also strove to express motion.

" In this way physiology, the functional conception in medicine, was an outcome of the Baroque spirit and HARVEY takes his place in the rank and file of such men as MICHELANGELO and GALILEO, who brought about the same sort of change in the realm of physics, a change from the static to the dynamic outlook."

The first chapter of the book, " Man," begins with the study of anatomy, " the foundation of modern medicine." Dr. SIGERIST briefly reviews the growth of our knowledge of the body. In chapter II, " The Sick

Man," he introduces the student to the patient. He tells of the position of the sick in various civilizations, noting the significant change in attitude toward the sick with the rise of Christianity.

In chapter III, "The Signs of Disease," Chapter IV, "Disease," and chapter V, "Causes of Disease," he traces in an orderly manner the development of our knowledge of disease; the early vague theories, the problem of disease at different times, the great epidemics and the search for the causative agents. He points out that diseases influence cultural conditions and that on the other hand some diseases seem characteristic of an epoch. Thus the Middle Ages are typified by the epidemics, affecting all of society. Of syphilis, he says:

"It is interesting too to note how the importance of a disease varies in the course of centuries. When syphilis became known during the renaissance it seemed to be a natural catastrophe or punishment from God for living in vice. In rococo society it was the cavalier disease, the poisoned arrows of Cupid whose wounds are healed by Mercury. In the mind of the common people syphilis spells disgrace, while today society regards the syphilitic who does not undergo treatment as a criminal."

In chapter VI, "Medical Aid," he tells of the efforts made to recognize and cure disease, while chapter VII, "The Physician," treats of the part played by the doctor himself, particularly his relation to society. There is an excellent account of the history of social insurance.

In each of these phases, Dr. SIGERIST has traced the development of thought, its meaning to contemporaries, and its significance to our own times. Modern medicine, in the large sense, the science and the art, is the product not only of the work of scientists, slowly and painfully acquired, but also of the cultural movements and the economic struggles of the race. This Humanistic philosophy, so much in accord with that of GEORGE SARTON, as expressed in *The History of Science and the New Humanism*, is the basis of Dr. SIGERIST's teaching.

"A few schools of medicine with courses in medical history have lately realized that their duty lies not alone in facilitating the acquiring of historical dates, but that they, as the only representatives of the philosophical sciences, are quite particularly called upon to blaze a trail to a medical anthropology, as they are the sole exponents of philosophy on the medical faculty."

S. V. LARKEY.

Thirty-Ninth Critical Bibliography

of the

History and Philosophy of Science and of the History of Civilization

(to September 1933,—with special reference to the nineteenth and twentieth centuries)

This thirty-ninth Bibliography contains about 924 items of which 232 deal with the nineteenth and twentieth centuries. They have been kindly contributed by the following fourteen scholars belonging to five different countries :

C. W. ADAMS (Hertford, England)
R. C. ARCHIBALD (Providence, R.I.)
T. L. DAVIS (Cambridge, Mass.)
L. GUINET (Brussels)
C. A. KOFOID (Berkeley, Cal.)
C. D. LEAKE (San Francisco)
A. MARX (New York)
J. PELSENEER (Brussels)
A. POGO (Cambridge, Mass.)
H. RENAUD (Rabat, Morocco)
L. SAPIN (Brussels)
G. SARTON (Cambridge, Mass.)
M. C. WELBORN (Cambridge, Mass.)
E. ZINNER (Bamberg).

The Bibliography includes as usual a series of addenda and errata to SARTON's *Introduction to the History of Science*, vols. 1 and 2 (Baltimore and London, 1927 and 1931). Its methods have been explained in the preface to the thirty-eighth Critical Bibliography (*Isis*, 20, 506-08).

Papers and books sent to the Editor are entered in this bibliography if they are relevant to its purpose. They may be the object of analytical notes or longer reviews, if this seems sufficiently necessary and the services of competent scholars are available. It is obvious that only a small number of publications can be adequately reviewed and that it is not even possible to give a brief description of each and every one. However, our classification is so comprehensive and so minute, that even if we do nothing but give the accurate title of an item and put it in its proper place, we are already rendering a real service to the author, the publisher and the learned public. There is no relation between the importance of a publication and the length of the note devoted to it.

The ultimate aims of this undertaking are: (1) to establish the History of Science as an independent discipline; (2) to demonstrate inductively the Unity of Knowledge and the Unity of Mankind; (3) to serve as a center of information and rallying ground to the scholars engaged in our studies.

Harvard Library, Room 185 GEORGE SARTON.
Cambridge, Massachusetts. *September* 18, 1933.

PART I

FUNDAMENTAL CLASSIFICATION (CENTURIAL)

VIth Century B.C.

Webb, E. J. CLEOSTRATUS and his work. *Journal of Hellenic Studies*, 48, 54-63, 1928. ISIS

Continuation of the polemic with FOTHERINGHAM about which see my *Introduction* (1, 73) and *Isis*, 14, 460. WEBB concludes: "I shall be content if I have persuaded my readers that the assertion, 'CLEOSTRATUS derived his zodiac from Babylon,' is by no means so simple as it sounds; and that anyone making it ought to enlighten us considerably as to its meaning. Does it mean—

"That CLEOSTRATUS borrowed twelve names only, giving them a new application?

"Or that he borrowed, not only names, but with them twelve constellations to which they applied?

"Or that he borrowed not only names and star-groups, but also the figures traced thereon and still shown on globes?

"Or that he borrowed not only names, groups, and figures, but also the method of employing equal ecliptic divisions which rose to such importance in Greek astronomy and in the mathematical astrology of the Greeks?

"That so many people should apparently have thought an affirmative answer to the first question equivalent to an affirmative answer to all is easily explained by the consideration that many people, as I have before remarked, have known the zodiacal names without knowing, or apparently caring to know, what they mean." G. S.

Vth Century B.C.

Cornford, Francis Macdonald. Before and after SOCRATES. X+114 p. New York, MACMILLAN, 1932. ISIS

"It seems clear that SOCRATES must be taken as the central figure in the period allotted to me, and that my business is to convey the significance of his conversion of philosophy from the study of Nature to the study of human life. I have tried, accordingly, so to describe the early Ionian science

as to show why it failed to satisfy SOCRATES, and I have treated the systems of PLATO and ARISTOTLE as attempts to carry into the interpretation of the world the consequences of SOCRATES' discovery."

Edelstein, Ludwig. *Περὶ ἀέρων* und die Sammlung der hippokratischen Schriften. VI+188 p. (*Problemata, Forschungen zur klassischen Philologie*, Heft 4). Berlin, WEIDMANN, 1931. ISIS

" Das Ziel der Arbeit ist, die Schrift *περὶ ἀέρων ὑδάτων τόπων* zu verstehen und in den Zusammenhang einzuordnen, in den sie inhaltlich und literarisch als Schrift des *Corpus Hippocraticum* gehört. Zuerst war es also notwendig, Aufbau und Absicht der Schrift *περὶ ἀέρων* zu bestimmen. Im I. Kapitel ist diese Analyse des Textes unter Verzicht auf eine eingehende Darstellung seiner Tradierung gegeben. Durch diese Analyse wird die Schrift *περὶ ἀέρων* in die Gruppe der prognostischen Bücher des *Corpus Hippocraticum* eingereiht. Eine Untersuchung über die Bedeutung der Prognose in den hippokratischen Schriften, die das II. Kapitel gibt, soll die Lehre, die sich in *περὶ ἀέρων* findet, verständlich machen und erklären. Die Prognose lässt sich aber nicht für sich verstehen; sie ist ein Teil der ärztlichen Tätigkeit. Man muss die ganze Haltung des hippokratischen Arztes kennen, um zu begreifen, warum er diese Prognose in so eigentümlicher Form ausgebildet hat. Das III. Kapitel zeichnet den hippokratischen Arzt, wie ihn vor allem die hippokratischen Schriften erkennen lassen. Dabei ist, wie überall, die Deutung des bekannten Materials, nicht Mitteilung neuen Materials die Aufgabe. Es bleibt die literarische Stellung der Schrift *περὶ ἀέρων* zu bestimmen, um ihre vollkommene Einordnung zu geben. Die Herkunft einer hippokratischen Schrift lässt sich nur erklären, indem man zur hippokratischen Frage Stellung nimmt. Wenn ich sie im IV. Kapitel anders zu lösen versuche, als man es bisher getan hat, bin ich mir bewusst, wie viel ich gerade von denen gelernt habe, gegen die ich mich wende."

Koch, Richard. Auslegung des dritten hippokratischen Aphorismus. *Sudhoffs Archiv für Geschichte der Medizin* 26, 281-88, 1933. ISIS

Mewaldt, Johannes; Nachmanson, Ernst. Zur Technik der Hippokratesedition. *Sitzb. der preuss. Akad. phil.-hist. Kl.*, 455-60, 1931. ISIS

Pfaff, Franz. Die nur arabisch erhaltenen Teile der Epidemienkommentare des GALEN und die Überlieferung des *Corpus Hippocraticum*. *Sitzb. der preuss. Akad. phil.-hist. Kl.* 558-81, 1931. ISIS

See note in the section on II(2).

Souques, A. Nature diphtérique des paralysies post-angineuses attribuées par les auteurs hippocratiques à la luxation spontanée des vertèbres cervicales, et description de l'angine diphtérique par ces mêmes auteurs. *Bulletin de la société française d'histoire de la médecine* 27, 77-98, 1933. ISIS

Sudhoff, Karl. HIPPOKRATES, der Vater der Medizin, auch der Vater der Hygiene (Aus der Ehrenhalle grosser Aerzte im deutschen Hygiene-Museum zu Dresden, II). *Fortschritte der Medizin*, 50, June 1932. ISIS

Wellmann, Max. Hippokratesglossare. 88 p. *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, 2. Berlin, SPRINGER, 1931 (RM. 16). ISIS

"Fassen wir das Hauptresultat unserer Abhandlung kurz zusammen: EROTIAN, der Verfasser des uns im Auszuge erhaltenen Hippokratesglossars unter NERO, war Arzt. Die direkte Vorlage für sein Glossar war der gelehrte Grammatiker ANTIGONOS aus Alexandreia zur Zeit des AUGUSTUS, TIBERIUS mit seinen *Ὑπομνήματα Ἱπποκράτους*, während sein Kommentar zu NIKANDERS *Theriaka* und *Alexipharmaka* in unsern Nikanderscholien vorliegt. Dieser Grammatiker hat für seinen Hippokrateskommentar 4 Werke zu Rate gezogen: für seine medizinischen Glossen den Kommentar des Arztes LYSIMACHOS AUS KOS *ὁ Ἱπποκράτειος*, für das attizistische Material die *Λέξεων συναγωγή* des aristarcheischen Grammatikers ARTEMIDOROS AUS TARSOS (1. Jahrh. v. Chr.), für seine Homerglossen die *Λέξεις Ὁμήρου* des älteren APOLLONIOS *ὁ Χαίριδος* (80 v. Chr.), der auch dem Scholiasten des APOLLONIOS VON RHODOS und dem jüngeren APOLLONIOS *ὁ Ἀρχιβίου* (50 n. Chr.) das Material geliefert hat, und für alles Naturwissenschaftliche die *Ὕλη* des SEXTIUS NIGER (AUGUSTUS). Der Arzt LYSIMACHOS VON KOS hat für seine *Ὑπομνήματα Ἱπποκράτους* das Glossar des Herophileers BAKCHEIOS AUS TANAGRA benützt, dem er die grosse Fülle des gelehrten Materials verdankt, die unser Glossar so wertvoll macht. BAKCHEIOS (um 200 v. Chr.) ist der Inaugurator der hippokratischen Glossenliteratur des Altertums. Er machte die erste Ausgabe der hippokratischen Schriften und schrieb im Anschluss an seine Ausgabe Kommentare zu HIPPOKRATES und sein Glossar mit Benützung der *Λέξεις* des grossen Grammatikers ARISTOPHANES VON BYZANZ. Die Glossare und Erklärungsschriften der Ärzte GLAUKIAS, EPIKLES, HERAKLEIDES VON TARENT und des Grammatikers EUPHORION (180 v. Chr.) traten seinem Glossar gegenüber in den Hintergrund."

Wilamowitz-Moellendorff, Ulrich von. Die *Καθαρμοί* des EMPEDOKLES. *Sitzb. der preuss. Akad. phil.-hist. Kl.*, 626-61, 1929. ISIS

IVth Century B.C. (whole and first half)

Becker, Oskar. Eudoxos-Studien I. Eine voreudoxische Proportionenlehre und ihre Spuren bei ARISTOTELES und EUKLID. II. Warum haben die Griechen die Existenz der vierten Proportionale angenommen? *Quellen und Studien zur Geschichte der Mathematik*, Abtg. B, Studien, 2, H. 4, 311-33, 369-87, 1933. ISIS

Hasluck, F. W. (1878-1920). PLATO in the folk-lore of the Konia

Plain. *Christianity and Islam under the Sultans*, vol. 2, 363-69, Oxford, 1929. ISIS

Places, Edouard des. Sur l'authenticité de l' " Epinomis." *Revue des études grecques*, 44, 153-66, 1931. ISIS

" L'authenticité de l'*Épinomis* a fait récemment l'objet de deux discussions approfondies, l'une de M. FRIEDRICH MÜLLER, l'autre de M. J. HARWARD. Les deux livres ont paru la même année et s'ignorent. Comme les titres l'indiquent, ils soutiennent des thèses opposées, et attribuent respectivement l'*Épinomis* à PHILIPPE d'OPONTE et à PLATON. Leurs bibliographies se complètent et mentionnent, l'une, les principaux adversaires, l'autre, les principaux partisans de l'authenticité; citons seulement parmi les premiers WILAMOWITZ, RITTER, JAEGER; parmi les autres RAEDER, BURNET, TAYLOR. Avant d'apporter une contribution personnelle à l'étude de l'*Épinomis*, sous la forme d'un classement de quelques particules de liaison et formules de récurrence, je voudrais examiner rapidement certains arguments de MM. MÜLLER et HARWARD."

Stenzel, Julius. Zahl und Gestalt bei PLATON und ARISTOTELES. 2te erw. Aufl. VIII+188 p., Leipzig, TEUBNER, 1933. ISIS

Iste Auflage, 1924 (*Isis*, 7, 177). — Inhaltsverzeichnis. I. Begrenzung der Aufgabe. II. Diairesis der Ideen. III. Diairesis der Zahlen. IV. Diairesis des Raümlichen. V. Das Gesamtbild der platonischen Spätphilosophie. VI. ARISTOTELES' Wendung : das unterste Glied der Diairesis die erste Wesenheit. VII. Kritische Einwendungen gegen " Zahl und Gestalt." VIII. Bindung der drei Diairesisbereiche durch den ὅμοιον-Begriff. IX. " Eins durch Analogie." X. Logos ἀόριστος. XI. Zusammenfassung.

Toeplitz, Otto. Die mathematische Epinomisstelle. *Quellen und Studien zur Gesch. d. Mathematik*, Abtg. B, 2, H. 4, 334-51, 1933. ISIS

IVth Century B.C. (second half)

Stein, Sir Aurel. The site of ALEXANDER's passage of the Hydaspes and the battle with POROS. *Geographical Journal* 80, 31-46, 5 pl., 2 maps, 1932. ISIS

" At Jalalpur all physical features are in closest agreement with the facts recorded about ALEXANDER's place of crossing." C. W. A.

Wilcken, Ulrich. ALEXANDERS Zug zum AMMON. Ein Epilog. *Sitzb. der preuss. Akad. phil.-hist. Kl.*, 159-76, 1930. ISIS

Wilcken, Ulrich. ALEXANDERS Zug in die Oase Siwa. *Sitzb. der preuss. Akad. phil.-hist. Kl.*, 576-603, 1928. ISIS

IIIrd Century B.C. (second half)

Delage, E. La géographie dans les *Argonautiques* d'APOLLONIOS DE RHODES. 310 p. 4, maps. Bordeaux, FÉRET, 1930. ISIS

Compte-rendu par A. SEVERYNS dans l'*Antiquité classique*, 1, 446-49, 1932. J. P.

Vogel, Kurt. Die Näherungswerte des ARCHIMEDES für $\sqrt{3}$. *Jahresbericht der D. M. V.*, 41, 152-58, 1932. ISIS

Reviewed in *Euclides*, 9, 32, 1932/33.

IInd Century B.C. (second half)

Hipparchos (*Introduction*, 1, 193). Ueber seine Grössenangaben und seine angebliche Beobachtung des Neuen Sternes von 134 v. Chr. s. E. ZINNER: Helligkeitsverzeichnis von 2373 Sternen bis zur Grösse 5.50 (*Veröffentlichungen d. Remeis-Sternwarte zu Bamberg*, II, 19-20, Bamberg, 1926). H. VOGT: Versuch einer Wiederherstellung von HIPPARCHS Fixsternverzeichnis (*Astronom. Nachrichten*, 5354-55, Kiel, 1925). FOTHERINGHAM in *Monthly Notices of the R. Astron. Soc.*, 78, 408-19, 1918. E. Z. ISIS

Keskinto inscription (*Introduction*, 1, 195). S. meine *Geschichte*, 108-10. E. Z. ISIS

Ist Century (whole and first half)

Hadidian, Yervant H. Philonism in the fourth Gospel. MACDONALD presentation vol., p. 213-22, Princeton, N. J., 1933. ISIS

" JOHN borrowed PHILO's *Logos* and shaped it after the JESUS whom he knew, and presented him to his readers as the true *Logos*, the creator of the world, the solution of the problem of God's relation to man and matter; the life and light of the world."

Klausner, Joseph. JÉSUS DE NAZARETH ; son temps, sa vie et sa doctrine. Trad. d'après l'original hébreu par ISAAC FRIEDMANN et M. R. LAVILLE, revue par l'auteur. Paris, PAYOT, 1933. ISIS

(Manilius). M. MANILII Astronomica. Recensuit A. E. HOUSMAN. Editio minor. XVI+182 p. Cambridge, University Press, 1932. ISIS

" Among the differences between this text and the text of the larger edition published book by book in the years 1903-1930 there are rather more than twenty which proceed from a change of opinion... A much greater number of the changes now made are in themselves, if I can trust my judgment,

changes for the worse, displacing amendments which are probably or at least possibly true and reinstating a tradition which is certainly or at least probably false; but I nevertheless think it reasonable and proper to make them, because the text is now no longer accompanied by discussion and justified by argument, and because in this cheaper and handier form it will be purchased or consulted by new readers whose scope is not the same and who may fairly expect consideration." (From the Preface).

Ist **Century** (second half)

Barnikol, E. Forschungen zur Entstehung des Urchristentums des neuen Testaments und der Kirche. II. Die drei Jerusalemreisen des PAULUS. Die echte Konkordanz der PAULUSbriefe mit der Wir-Quelle der Apostelgeschichte. 63 p., Kiel, W. G. MÜHLAU, 1929.

ISIS

I. Einführung in das Zentralproblem der Geschichte des apostolischen Zeitalters. II. Die drei Jerusalemreisen der PAULUSbriefe, die beiden des Galaterbriefes, als sicherer Ausgangspunkt und die fünf Jerusalemreisen der Apostelgeschichte. III. Die möglichen Versuche der Gleichsetzungen. IV. Der Vergleich von Gal und Wir-Quelle hinsichtlich der Jerusalemreisen des PAULUS. V. Was wird aus AG 11 und AG 15? VI. Ueber das Alter der Gleichsetzung Gal 1, 1 = AG 18, 22: WIESELER und VOLKMAR. VII. Tabellarische Uebersicht: Paulinische Synopse und Chronologie der Jerusalemreisen nach der echten Konkordanz des *Corpus Paulinum* (Gal) und der AG (Wir-Quelle). (Band I, *Isis*, 13, 406.)

Barnikol, E. Forschungen zur Entstehung des Urchristentums des neuen Testaments und der Kirche. III. Personen-Probleme der Apostelgeschichte JOHANNES MARKUS, SILAS und TITUS. 32 p., Kiel, W. G. MÜHLAU, 1931. ISIS

I. JOHANNES MARKUS. II. SILVANUS und SILAS. III. Das TITUS-Problem: TITUS = SILAS. IV. Die Geschichte dieser Identifizierung. V. SILAS-TITUS als Verfasser der Wir-Quelle.

Barnikol, E. Forschungen zur Entstehung des Urchristentums des neuen Testaments und der Kirche. IV. Römer 15. Letzte Reiseziele des PAULUS Jerusalem, Rom und Antiochien. Eine Voruntersuchung zur Entstehung des sogenannten Römerbriefes. 23 p., Kiel, W. G. MÜHLAU, 1931. ISIS

Barnikol, E. Forschungen zur Entstehung des Urchristentums des neuen Testaments und der Kirche. V. Der nichtpaulinische Ursprung des Parallelismus der Apostel PETRUS und PAULUS (Galater, 2, 7-8). 31 p., Kiel, W. G. MÜHLAU, 1931. ISIS

I. Die Textprobleme der PAULUSbriefe: *Κηφᾶς* oder *Πέτρος*? II. Die nichtpaulinische Struktur von Gal. 2, 7-8. III. Der ursprüngliche Text des PAULUS. IV. Geschichte des Urtextes und der Interpolation.

Barnikol, E. Mensch und Messias. Der nichtpaulinische Ursprung der Präexistenz-Christologie. Prolegomena zur neutestamentlichen Dogmengeschichte. I. 224 p., Kiel, W. G. MÜHLAU, 1932. ISIS

A. Untersuchung und Vergleich der Deutero- und Tritopaulinen. B. Untersuchung der Predigt JESU und des Messiasglaubens der Urgemeinden. C. Die durch die Geschichtlichkeit der PAULUSbriefe und der Apostelgeschichte und durch die jüdische Messialogie verursachten Problemstellungen. D. Untersuchung der PAULUSbriefe. E. Untersuchung der paulinischen Briefe der Kampf- und Spätzeit. F. Endergebnis und Schlussthesen. G. Das Jahrhundert wissenschaftlicher Erforschung der Präexistenz-Christologie des PAULUS (1824-1931). Bibelstellen-Register und Personen-Verzeichnis.

Barnikol, E. Philipper II. Der marcionitische Ursprung des Mythos-Satzes Phil. 2, 6-7. Prolegomena zur neutestamentlichen Dogmengeschichte. II. 134 p., Kiel, W. G. MÜHLAU, 1932. ISIS

A. Einleitung: Aufgabe, Text und Exegesen. B. Struktur-Analyse der beiden Textformen A und B. C. Phil. 2 bei den Kirchenvätern und das Fehlen des Mythos-Satzes. D. MARCION und Phil. 2. MARCIONS mythologische Christologie und seine adäquate Deutung des B-Einschubs. E. Die Wirkung von MARCIONS-Text und Christologie auf die altkatholische Kirche. F. PAULUS und Philipper II. G. Das Verhältnis des A-Textes und des M.-Textes zum *Corpus Paulinum*. H. Aus der Geschichte der Exegese von Phil. 2. Bibelstellen-Register (mit Ausnahme von Phil. 2) Altchristliche Autoren und Schriften. Moderne Autoren.

Pliny the Elder (*Introduction*, 1, 249). KARL RÜCK: Die Naturalis Historia des PLINIUS im Mittelalter. *Sitz. Ber. B. Akad. d. Wiss. philos. philol. und hist. Kl.*, 203-318, München, 1898. WILHELM KROLL: Die Kosmologie des PLINIUS. Mit 2 Exkursen von H. VOGT. *Abh. Schles. Ges. f. vaterländische Cultur. Geisteswissenschaftliche Reihe*, H. 3, Breslau, 1930. E. Z. ISIS

IInd Century (whole and first half)

Bentwich, Norman. The Graeco-Roman view of Jews and Judaism in the second century. *Jewish Quarterly Review*, 23, 337-48, 1933. ISIS

(Epictetos). *Manuel.* Traduit en annamite sur la version française de THUROT par PHAM QUYNH. Introduction de G. PEYROT. XVI+56 p. (*La Pensée de l'Occident, Bibliothèque de traductions*). Hanoi, NGUYÊN-VAN-VINH, 1929. ISIS

Reviewed by NGUYÊN-VAN-TO, *BEFEO*, 30, 149-51, 1930.

Meyerhof, Max. L'opération de la cataracte du chirurgien ANTYLLE

D'ALEXANDRIE (IIième siècle après J.-C.). Extrait du Livre d'or pour le jubilé du PROF. PAPAYOANNOU. (No place or date, received August 1933). ISIS

French translation of the Arabic text contained in AR-RĀZI's *Ḥāwī* (Escorial Ms. 806) with reference to HIRSCHBERG's previous edition (1899). G. S.

Mouterde, René ; Poidebard, A. La voie antique des caravanes entre Palmyre et Hit au IIe siècle ap. J.-C. d'après une inscription retrouvée au s.-e. de Palmyre (mars 1930). *Syria*, 12, 101-15, 3 fig., 1 pl., 1931. ISIS

" La découverte en mars 1930, à 22 km. au sud-est de Palmyre, de l'inscription dont le R. P. MOUTERDE a bien voulu établir la lecture et le commentaire, termine la campagne entreprise, de novembre 1929 à avril 1930 avec la collaboration du groupe d'aviation de Damas, pour rechercher, en territoire syrien, l'ancienne voie des caravanes entre Palmyre et l'Euphrate. Elle nous apporte un document précis sur la grande route caravanière du IIe siècle, reliant, par Hit, Palmyre à Vologésias, centre commercial parthe, et à Spasinou Charax, comptoir du golfe Persique."

Mžik, Hans v. Neue Gesichtspunkte zur Würdiging der Bedeutung der " Geographie " des KLAUDIOS PTOLEMAIOS für die Orientalistik (mit den einleitenden Abschnitten der " Weltschau " des (Pseudo-) MOSES XORENAÇI in deutscher Uebersetzung). *Litterae orientales*, Heft 54, 1-19, 1933. ISIS

1. PTOLEMAIOS als Lehrmeister der Kartographie. Sein geographisches Handbuch in Vergangenheit und Gegenwart. II. PTOLEMAIOS in armenischem Gewande. III. Die einleitenden Abschnitte der " Weltschau " des (Pseudo-) MOSES XORENAÇI.

Ptolemy (*Introduction*, 1, 274). P. LUCKEY : Das Analemma von PTOLEMÄUS. *Astron. Nachrichten* 5498, Kiel 1927. P. KEMPF : *Untersuchungen über die ptol. Theorie der Mondbewegung*. Diss. 40 S., Berlin 1878. D. J. SCHUMACHER : *Untersuchungen über die ptol. Theorie der unteren Planeten*. 78 S. Münster 1917. Ueber die Genauigkeit der Beobachtungen des PTOL., s. ZINNER : *Geschichte* S. 87, 88, 92-94, 120-21. Ueber die Beobachtungen, FOTHERINGHAM, *Monthly Notices*, 78, S. 419-22. Ueber die Grössenangaben des PTOL. : CHARLES S. PEIRCE in *Harv. Annals*, 9, 142-48, 1878 ; ferner, LUNDMARK in *Vierteljahrsschrift d. Astron. Gesellschaft*, 61, 230-36, Leipzig 1926 und ZINNER : *Helligkeitsverzeichnis*, 20-23, Bamberg, 1926. E. Z. ISIS

IInd Century (second half)

Pfaff, Franz. Die nur arabisch erhaltenen Teile der Epidemien-

kommentare des GALEN und die Überlieferung des *Corpus Hippocraticum*. *Sitzb. der preuss. Akad. phil.-hist. Kl.*, 558-81, 1931.

ISIS

" Die Ergebnisse dieser Untersuchung lassen den seitherigen Anschauungen über die Überlieferung der hippokratischen Schriften keinen Raum mehr. Der scharfe, unleugbare Gegensatz zwischen dem Text der Teile der Epidemien, zu denen die galenischen Erklärungen in griechischer Sprache vorhanden sind, und den Teilen, bei denen sich der Galenkommentar nur arabisch erhalten hat, lassen unbezweifelbar erkennen, dass mit dem Text unserer griechischen Hippokrateshandschriften gewaltsame Änderungen in grosser Zahl vorgenommen worden sind, und das der Text der *Collectio Alexandrina* in ihnen nicht aufbewahrt ist. Dieses Ergebnis gilt zunächst für die Epidemien, bei denen uns der Zufall durch Verlust der Galenkommentare ein Stück nicht-galenischen Hippokratestext gelassen hat. Ob dieses Ergebnis auch für die anderen Hippokratesschriften Gültigkeit hat, müssen Forschungen nach den Spuren der korrigierenden Hand lehren. Die vorliegende Arbeit wird also den Anstoss zu einer Neuaufrollung der Überlieferungsgeschichte des *Corpus Hippocraticum* geben müssen, damit wir zur Klarheit über die Schicksale dieser Werke kommen und damit eine untrügliche Grundlage für eine Neuausgabe geschaffen wird, oder falls das mit unseren Mitteln nicht mehr möglich ist, mindestens doch alle falschen Illusionen über die Gewähr jener ' Uberlieferung ' unmöglich gemacht werden."

Wenkebach, Ernst. Textkritische Beiträge zu GALENS *Protreptikos-fragment*. *Sudhoffs Archiv für Geschichte der Medizin* 26, 205-52, 1933. ISIS

Wilamowitz-Moellendorff, Ulrich von. MARCELLUS VON SIDE. *Sitzb. der preuss. Akad. phil.-hist. Kl.*, 3-30, 1928. ISIS

IIIrd Century (whole and first half)

Rome, A. Sur la date d'ARTÉMIDORE (*Cat. cod. astr.* VIII, 2, p. 129). *Annales de la société scientifique de Bruxelles* 51, série A, 104-12, 1931. ISIS

" Résumé : ARTÉMIDORE, commentateur de PTOLÉMÉE (cf. *Cat. cod. astr.* VIII, 2, p. 129), vivait au commencement du III^e^ siècle, après J.-C."

IIIrd Century (second half)

Cumont, Franz. La bibliothèque d'un manichéen découverte en Egypte. *Revue de l'histoire des religions*, 107, 180-89, 1933. ISIS

" Un mémoire substantiel de MM. CARL SCHMIDT et H. J. POLOTSKY, qui paraît dans les *Sitzungsberichte de l'Académie de Berlin*, nous apporte des informations bienvenues sur la découverte merveilleuse d'ouvrages manichéens faite récemment en Égypte."... " Au total, cette admirable

trouvaille nous a rendu sept livres, dont deux sont des œuvres originales de MANI lui-même et les autres ont été écrits par ses successeurs immédiats ou ceux de la deuxième génération. Les manuscrits eux-mêmes sont des copies qui ne sont pas ou ne sont guère postérieures à l'an 400. Leur ensemble ne compte pas moins de deux mille pages, dont beaucoup, à ce qu'on espère, pourront être complètement déchiffrées."

Cumont, Franz. La note sur la découverte de livres manichéens. *Revue de l'histoire des religions*, 107, 104-05, 1933. ISIS

Reprint of a note originally published in *Syria*, XIII, 403 apropos of the startling discovery of Coptic translations of MANI's own works in the Fayum. G. S.

IVth Century (second half)

Rome, A. Les explications de THÉON D'ALEXANDRIE sur le théorème de MÉNÉLAS. *Annales de la société scientifique de Bruxelles*, 53, 39-50, 3 fig., 1933. ISIS

" Tel qu'il se présente dans l'*Almageste*, le théorème de MÉNÉLAS appliqué à la sphère n'est pas démontré d'une façon générale. Il semble, quoi qu'en dise BJÖRNBO, que les *Sphériques* de MÉNÉLAS, telles que les ont connues PTOLÉMÉE et THÉON, ne contenaient pas une preuve complète de ce théorème, qui constituait à lui tout seul la trigonométrie sphérique de l'antiquité."

VIth Century (whole and first half)

Ammonios, son of Hermias (*Introduction* 1, 421). ZINNER's *Geschicht* (122-3). E. Z. ISIS

Thomsen, Peter. Der Künstler der Mosaikkarte von Mâdaba. *Byzantinische Zeitschrift*, 30, 597-601, 1929-30. ISIS

VIIth Century (whole and first half)

Mittwoch, Eugen. MUḤAMMEDS Geburts- und Todestag. *Islamica*, 2, 397-401, 1926. ISIS

" Der Tod am Geburtstage ist eine Vorstellung, die mir aus nichtjüdischen Kreisen nicht bekannt ist. Soweit ich sehe, findet sie sich in den christlichen Heiligenlegenden nicht. Hier dürfte mit Sicherheit jüdischer Einfluss festzustellen sein. Wie der Islam dem 12. Rabī'I so hat auch das spätere Judentum dem 7. Adar ein besonderes Gepräge gegeben. Der Gang der Entwicklung ist freilich ein anderer gewesen. Während der Islam den 12. Rabī' I als *Geburtstag* des Propheten festlich begeht, hat das spätere Judentum dem 7. Adar als dem *Todestage* MOSES einen ernsten Charakter verliehen."

Pelliot, Paul. Le nom turc des " Mille sources " chez HIUAN-TSANG. *T'oung Pao*, 27, 189-90, 1930. ISIS

VIIIth Century (whole and first half)

Davis, Ruby. BEDE's early reading. *Speculum*, 8, 179-95, 1933. ISIS

Saxl, Fritz; Beer, Arthur. The zodiac of Quṣayr 'Amra, by FRITZ SAXL. The astronomical significance of the zodiac of the Quṣayr 'Amra, by ARTHUR BEER. Reprinted from K. A. C. CRESWELL, *Early Muslim architecture*, 1, 289-303, 19 fig., 1 pl. Oxford, Clarendon Press, 1932. ISIS

Reviewed by A. POGO, *Isis*, 19, 504-06, 1933.

VIIIth Century (second half)

Aomi-no Mabito Genkai (779). Le voyage de KANSHIN en Orient (742-754). Traduit par J. TAKAKUSU. *BEFEO*, 28, 441-73, 1928; 29, 47-62, 1929. ISIS

Bräunlich, E. AL-KHALĪL und das *Kitāb al-'ain*. *Islamica*, 2, 58-95, 1926. ISIS

Pelliot, Paul. Une phrase obscure de l'inscription de Singan-fou. *T'oung Pao*, 28, 369-78, 1931. ISIS

Apropos of the Nestorian monument of 781 in Hsi-an-fu (see my *Introduction*, 1, 526). G. S.

IXth Century (whole and first half)

Datta, Bibhutibhusan. On the relation of MAHĀVĪRA to ŚRĪDHARA. *Isis*, 17, 25-33, 1932. ISIS

" From what has been stated above there can be little doubt that either ŚRĪDHARA or MAHĀVĪRA was greatly influenced, directly or indirectly, by the writings of the other. But these facts do not help us much to ascertain the priority of either of them over the other. If, however, the passage in SANKARA BALKRISNA DIKSHIT's copy of the manuscript of the *Gaṇita-sārasamgraha* which contains reference to ŚRĪDHARA be truly authentic, then ŚRĪDHARA surely lived before MAHĀVĪRA. There is another fact which will throw some light on this matter. ŚRĪDHARA was undoubtedly the most distinguished mathematician of his time. His reputation seems to have spread far and wide, more than that of any other early Hindu mathematician, not excepting the great BHĀSKARĀCĀRYA II (born 1114). Even in the middle of the thirteenth century the ideal of a Hindu mathematician was to be a ŚRĪDHARA. Such a writer can hardly be believed to have been a mere borrower. On the other hand, it has been expressly stated by MAHĀVĪRA

that his treatise is a 'collection' *(saṅgraha)* from the works of previous writers."

Drexl, Franz. ACHMET und das syrische Traumbuch des Cod. Syr. Or. 4434 des Brit. Mus. *Byzantinische Zeitschrift*, 30, 110-13, 1929-30. ISIS

See note on AḤMAD IBN SIRIN in my *Introduction* 1, 558. G. S.

[Khwārizmī]. Das *Kitāb ṣūrat al-arḍ* des ABU JA'FAR MUḤAMMAD IBN MŪSĀ AL-KHWĀRIZMĪ. Herausgegeben nach dem handschriftlichen Unikum der Bibliothèque de l'Université in Strassburg (cod. 4247) von HANS v. MŽIK. XXXI+164 p., 5 pl. (*Bibliothek arabischer Historiker und Geographen*, 3). Leipzig, HARRASSOWITZ, 1926. ISIS

Reviewed by E. HONIGMANN, *Islamica*, 3, 160-63, 1927. See other notes by the editor and the reviewer, *ibidem*, 265-70, 422-25, 1927.

Pacificus Archidiaconus Veronensis, der zur Zeit des LOTHAR, des Sohnes von LUDWIG D. FROMMEN lebte, erfand eine Nachtuhr (UGHELLUS, *Italia sacra*, vol. 5, 609). E. Z. ISIS

Walafrid Strabo (*Introduction* 1, 570). ZINNER: *Verzeichnis* Nr. 10672-79. E. Z. ISIS

IXth Century (second half)

Donaldson, Dwight M. AL-YA'QŪBĪ's chapter about JESUS CHRIST. (Translated from the *Ta'rīkh*, edited by HOUTSMA, vol. 1, pp. 74-89.) MACDONALD presentation vol., 89-105, Princeton, N. J., 1933. ISIS

Translation of the chapter on JESUS CHRIST compiled by YA'QŪBĪ from the *Four Gospels* and the *Acts of the Apostles*. G. S.

Serapion the Elder (*Introduction* 1, 608). Both of the medical works (or two parts of the same work?), one of twelve and one of seven books, were translated from Syriac into Arabic, and not just the latter one. Cf. M. CASIRI, *Bibliotheca Escurialensis*, I, 261, Madrid 1760. M. C. W. ISIS

Xth Century (whole and first half)

'Abd al-Rāziq, Muṣṭafā. The philosopher ABŪ NAṢR AL-FĀRĀBĪ. *Review of the Arabic Academy of Damascus*, vol. 12, 385-97, 1932 (in Arabic). ISIS

Elder, E. E. AL-ṬAḤĀWĪ's "Bayān al-sunna wa'l-jamā'a." MACDONALD presentation vol., p. 131-44, Princeton, N. J., 1933. ISIS

"The confession of faith, Bāyan al-sunna wa'l-jamā'a (also called 'Aqīda ahl al-sunna wa'l-jamā'a, or Risāla fi uṣūl al-dīn), written by AL-ṬAḤĀWĪ (d. 933), is one of the earliest creeds of the Muslim faith. It is interesting, if for no other reason, because it dates from the beginning of the fourth century of Islām when dialectic was first being used to organize a system of belief. AL-ṬAḤĀWĪ's fame rests on his being the greatest Ḥanafī lawyer produced in Egypt. Most of his books deal with subjects related to Muslim jurisprudence. In his brief compendium of Islamic doctrine, which is translated below, AL-ṬAḤĀWĪ's position resembles that of ABŪ ḤANĪFA and AL-MĀTURĪDĪ in shunning the extremes of AL-ASH'ARĪ. However, he often avoids explicit statements that would class him as belonging to one school or the other."

al-Fārābī, Abū Naṣr. Iḥṣa' al-'ulūm (Enumeration or classification of the sciences.) Edition of the Arabic text together with Arabic preface and notes by 'UTHMĀN MUḤAMMAD AMĪN. 24+80 p. Cairo, AL-KHĀNJĪ, 1350 (1931). ISIS

Reviewed by GEORGE SARTON, *Isis*, 19, 201-03, 1933.

Farmer, Henry George. A further Arabic-Latin writing on music. *Journal of the Royal Asiatic Society*, 307-22, 1933. ISIS

Apropos of the *De ortu scientiarum* ascribed to AL-FĀRĀBĪ.

Fischel, Walter. The origin of banking in mediaeval Islam: a contribution to the economic history of the Jews of Baghdad in the tenth century. *Journal of the Royal Asiatic Society*, 339-52, 1933. ISIS

Kramers, J. H. La question BALKHĪ-IṢṬAKHRĪ-IBN ḤAWQAL et l'Atlas de l'Islam. *Acta orientalia*, 10, 9-30, figs., 1931. ISIS

"Le but du présent article est de démontrer dans quelle mesure l'étude des cartes géographiques qu'on trouve dans les manuscrits de géographes arabes peut contribuer à la critique philologique des ouvrages auxquels appartiennent ces cartes. J'espère qu'il en ressortira en même temps que l'étude des cartes elles-mêmes ne peut nullement être séparée de celle des textes accompagnants"... "Le trait essentiel de la cartographie dans le cadre de la science islamique est sans contradiction l'Atlas de l'Islam. C'est une série de 21 cartes, qu'on retrouve dans un grand nombre de manuscrits dont le texte donne la description du monde de l'Islam entier au IV^e^-X^e^ siècle, manuscrits qui se rattachent aux noms d'auteurs : AL-BALKHĪ, AL-IṢṬAKHRĪ, IBN ḤAWQAL et AL-MAQDISĪ. On les trouve toujours dans le même ordre de succession, qui correspond avec le traitement des différentes parties de ce monde dans les textes"... "Si IṢṬAKHRĪ I est le plus ancien type de l'Atlas de l'Islam ce n'est pas chose étonnante que ce type ait été conservé en général pour la partie orientale de l'Islam. Car l'Atlas a été composé pour la première

fois en Perse orientale et devait donc être surtout autoritatif pour ces régions-là. La composition de l'Atlas même traduit encore son origine persane; chacune des provinces persanes y a été traitée comme un *iqlīm* séparé. Pour l'Occident, au contraire, le type IṢṬAKHRĪ montre encore clairement qu'on en faisait peu de cas (ce qui est aussi vrai pour le texte). Il fallait un IBN ḤAWQAL pour élever la géographie et la cartographie de l'Occident au même niveau que celle de l'Orient. Comme le pensait DE GOEJE avec grande probabilité, AL-IṢṬAKHRĪ aurait fait avant lui la même chose pour la province de Fars. Peut-être la description de la Transoxanie et du Khorasan était-elle déjà l'œuvre d'AL-BALKHĪ, illustre savant de la cour des Samanides, lui-même."

Nemoy, Leon. QIRQISĀNĪ's *Kitāb al-anwār wal-marāqib*. *American Journal of Semitic Languages and Literatures* 47, 144, 1931. ISIS

Announcing the preparation of a new edition and translation.

Polachek, Harry. A method of multiplication used by SAADIA GAON in the 10th century. *Scripta mathematica*, 1, 245-46, 1933. ISIS

Skoss, Solomon L. Fragments of unpublished philological works of SAADIA GAON. *Jewish Quarterly Review*, 23, 329-36, 2 pl., 1933. ISIS

Xth Century (second half)

'Abd al-Raḥmān al-Ṣūfī (*Introduction* 1, 665). Über seine Grössenangaben s. LUNDMARK in *Vierteljahrsschrift d. Astron. Ges.* (61, Leipzig, 1926), und ZINNER: *Helligkeitsverzeichnis*, 23-26, Bamberg, 1926. E. Z. ISIS

'Alī ibn 'Abbās (*Introduction* 1, 677). Il vaut mieux écrire *Kitāb al-malakī* que *Kitāb al-malikī* comme on le trouve partout. H. DERENBOURG avait déjà fait cette correction dans un article sur les Mss. arabes de Madrid inclus dans l'Homenaje a Fr. Codera et il avait raison grammaticalement. H. R. ISIS

Gerbert (*Introduction* 1, 669-71). Add the following note. D'AVEZAC: Observations sur un chapitre des œuvres de GERBERT. Publié pour la première fois dans l'édition de M. OLLERIS. *Comptes rendus de l'Académie des Inscriptions*, séance du 17 avril, 1868. 8 p. ISIS

Apropos of weights and measures.

Hamdānī, Ḥusain F. al-. Rasā'il ikhwān as-ṣafā in the literature of the Ismā'īlī ṭaiyibī da'wat. *Der Islam*, 20, 281-300, 1932. ISIS

Rigobon, Marcella. Il teatro e la latinità di HROTSVITHA. XII+42 p.

(R. Università di Padova, *Pubblicazioni della Facoltà di Lettere e Filosofia*, vol. 2). Padua, MILANI, 1932. ISIS

" Leggendo le opere di HROTSVITHA si hanno due impressioni contrastanti : l'eleganza della locuzione e la scioltezza e la correttezza della lingua sembrano avvertirci che siamo in un periodo di rifiorente cultura; d'altra parte la mancanza di una profonda concezione poetica, il candore con cui sono trattati i soggetti del più crudo verismo, l'ingenuità quasi puerile nello sciogliere le situazioni più aspre, le monotone e assidue ripetizioni di certe frasi ci rivelano un' arte ancora infantile. Tuttavia i drammi, che vanno perfezionandosi dal ' *Gallicano* ' all' ' *Abraham*,' attestano il forte ingegno della dotta monaca, che si elevava bene al di sopra dei suoi contemporanei. Se anche il suo teatro fosse privo di ogni pregio drammatico, resterebbe tentativo interessante d'innovazione di fronte alla forma narrativa delle sue fonti latine : monumento singolare, dove sono mescolati insieme elementi sacri e profani, classici e medievali; dove il dramma antico pare si accosti e si congiunga con le forme primitive del dramma moderno."

Yaḥyā al-Hāshimī, Muḥammad. Physical and natural sciences in the letters of the Brethren of Purity. *Review of the Arabic Academy of Damascus*, 12, 513-20, 1932 (in Arabic). ISIS

XIth Century (whole and first half)

Furlani, G. AVICENNA e il *cogito, ergo sum* di CARTESIO. *Islamica*, 3, 53-72, 1927. ISIS

Ḥazm, Ibn. The dove's neckring about love and lovers. Composed by ABŪ MUḤAMMAD 'ALĪ IBN ḤAZM AL-ANDALUSĪ... Translated from the unique Ms. in the University of Leiden, edited by D. K. PÉTROF in 1914, by A. R. NYKL. CXXIV+244 p. Chicago, Oriental Institute of the University of Chicago, 1931. ISIS

Reviewed by D. B. MACDONALD, *Isis*, 17, 430-31, 1932.

Meïssa, M. S. Le message du pardon d'ABOU'L'ALA DE MAARRA. Préface de W. MARÇAIS. IV+203 p. Paris, GEUTHNER, 1932 (20 frs.). ISIS

Extraits traduits d'une des œuvres les plus originales et les plus audacieuses de la littérature arabe. Ce fut NICHOLSON qui la révéla à l'Occident. Une édition abrégée et commentée en a été donnée en 1925 par KĀMIL KITĀNĪ avec préface par TAHA HOSSAYN. G. S.

XIth Century (second half)

Brockelmann, C. Mitteltürkischer Wortschatz nach MAḤMŪD AL-KĀSHGHARĪS *Dīvān Lughāt at-Turk*. Bearbeitet von C. BROCKELMANN, mit Unterstützung der ungarischen Akademie der Wissen-

schaften, VI+252 p. (*Bibliotheca Orientalis Hungarica*, I); Budapest, Korösi Csoma-Gesellschaft, 1928. ISIS

The *Dīwān lughāt at-Turk* of MAḤMUD AL-KĀSHGHARĪ was composed in 466/1066 and published in Istanbul (1333-5 H.), but without index. The present volume will considerably increase its value for Turcologists. BROCKELMANN has written various other papers on AL-KĀSHGHARĪ, which are enumerated in the preface. Reviewed by JOSEPH SCHACHT, *Der Islam*, 18, 282-5, 1929 and by the late G. BERGSTRAESSER, *Islamica*, 4, 328-33, 1931. G. S.

Somadeva. The ocean of story, being C. H. TAWNEY's translation of SOMADEVA's *Kathā Sarit Sāgara* (or *Ocean of streams of story*), now edited with introduction, fresh explanatory notes and terminal essay by N. M. PENZER... in 10 vols. London, Sawyer, completed in 1928. ISIS

Reviewed by PAUL PELLIOT, *T'oung Pao*, 28, 436-44, 1931.

Wilhelm von Hirsau (*Introduction* 1, 762). Die Bezeichnung " orrery " für die steinerne Säule mit der Scheibe dürfte wohl nicht zutreffen. Zu berücksichtigen wären wohl die wichtigeren Arbeiten über Zeitrechnung: ZINNER, *Verzeichnis* Nr. 11988, 12003, 12097, 12098, 12107, 12126, 12159, 12187, 12221. E. Z. ISIS

XIIth Century (whole and first half)

Abraham ibn Ezra (*Introduction* 2, 187-89). P. 187. ABRAHAM IBN ESRA's exegesis and his criticism is entirely based on the work of his Spanish predecessors, especially MOSES IBN CHIQUITILLA, as we have learned since the works of these older scholars have gradually been partly recovered; only his trenchant style is entirely his own. Even the statement about a second ISAIAH he took from MOSES. P. 188. ERNST MÜLLER, *Abraham ibn Esra, Buch der Einheit aus dem Hbr. übersetzt nebst Parallelstellen und Erläuterungen zur Mathematik Ibn Esras*, Berlin, 1921. Grammatik der hebr. Zahlwörter (*Jesod Mispar*) von ABR. IBN ESRA aus Hss. herausgegeben und commentiert von S. PINSKER, Vienna, 1863 in his *Einleitung in das Babylonisch-Hebräische Punktationssystem*, p. 133-72. P. 188 note 6. The only complete ed. is Venice 1507. In 1485, only one of IBN ESRA's treatises was published: *De nativitatibus*; another one: *De luminaribus et diebus criticis*, appeared already in 1482/3 (R. LEVY is somewhat incorrect in his bibliographical statements which you follow; cf. *Romania*, 54, 137, 1928. P. 189 *Yesod Mora* ed. M. CREIZENACH, Frankfurt a.M. 1840 two edd., one with German, the other with Latin translation. The Iggereth Ha-Shabbath (on

the question whether the day begins with the evening or the morning), ed. M. FRIEDLÄNDER in *Transactions of the Jewish Historical Society of England* (II) 61-75, 1894-5; cf. *ib.* 52-9. S. OCHS, Ibn Esras Leben und Werke, *MGWJ*, 60, 47-58, 118-34, 193-212, 1916.
A. M. ISIS

Abraham ibn Ezra (*Introduction* 2, 187-9). s. ZINNER *Verzeichnis* Nr. 100-72 und ARTHUR ZACHARIAS SCHWARZ, Aus den Handschriften der Wiener "Tabulae" (*Abhandlungen zur Erinnerung an Hirsch Perez Chajer*, 204-36, Vienna, 1932. E. Z. ISIS

Abraham ibn Ezra (*Introduction* 2, 188, footnote 6). The edition of Venice, P. LIECHTENSTEIN, 1507 is the first and only complete one of ABRAHAM's astrological treatises. Of the ten treatises only one, *De nativitatibus* had been printed by RATDOLT in 1485, another, *De luminaribus et diebus criticis*, had been printed at Padua in 1482, the other eight appeared for the first time in the edition of 1507. Note taken from a catalogue published by E. P. GOLDSCHMIDT & Co. in London. G. S. ISIS

Baḥya ben Joseph (*Introduction* 2, 184). I. GOLDZIHER, *Kitāb ma'ānī al-nafs*, Buch vom Wesen der Seele von einem Ungenannten. Berlin 1907. *Abh. K. G. W. Göttingen, phil.-hist. Kl.* 9. The Hebrew translation is not a medieval work but by BROYDÉ himself. The best German translation of BAḤYA is by E. BAUMGARTEN, Vienna 1854 with an introduction by A. GEIGER, *Die ethischen Grundlagen des Buches über die Herzenspflichten*. English translation of Introd. and part I by MOSES HYAMSON, New York, 1925. D. KAUFMANN, Die Theologie des Bachja ibn Pakuda, *SBWA*, phil.-hist. Kl., 77, 189 ff., 1874, *Ges. Schriften*, 2, p. 1-98, Frankfurt a.M., 1910.
A. M. ISIS

Bājja, Ibn (*Introduction* 2, 183). HERZOG's edition is a reprint in a few copies from KOBETZ AL-JAD, *Sammelband kleiner Beiträge aus Handschriften* (Berlin 1895). The *Risala* was edited by M. SCHREINER in BRAININ's *Mimisrach umimaarabh* II, 96-106, Vienna, 1895, and IV, 26-39, Berlin, 1899. A. M. ISIS

Baṭalyūsī (*Introduction* 2, 182). IBN MOṬOṬ did not publish a partial translation but plagiarized the book in his own work. A. M. ISIS

Hadassi (*Introduction* 2, 190). The book was printed Goslow 1836. An omitted chapter ed. W. BACHER *JQR*, 8, 431-44. Criticism

esp. P. F. FRANKL, *MGWJ*, 31, 1-13, 72-85, 268-75, 1882; 32, 399-419, 1883; 33, 448-57, 513-21, 1884. A. M. ISIS

Jacob ben Meïr (*Introduction* 2, 190, 143). We have no Biblical commentaries by him on any book, but only quotations from that of *Job* and individual exegetical remarks on numerous passages. He could hardly be termed one of the leading Hebrew grammarians.

The *Tosafot* were printed since the 1st edition of the *Talmud* opposite RASHI's commentary; in Mss. they were copied separately. ROSENTHAL only edited the *responsa* of the *Sefer ha-Yashar*. The *Hakraot* were edited together with DUNASH's criticism of MENAHEM's *Mahberet*, London, 1855 (not with the *Mahberet* itself). M. WEINBERG, Die Polemik des R. TAM gegen RASCHI *in Festschrift D. Hoffmann*, 387-420, Berlin, 1914. A. M. ISIS

Joseph ibn Ẓaddīq (*Introduction* 2, 187). P. 187. On what basis do you call NAHUM HA-MAARABI a poet? Another little treatise by JOSEF IBN ZADDIQ, *Sefer ha-Musar*, was published for the first time from a Ms. D. KAUFMANN by M. S. JUNGER, Budapest 1908 (also a Hungarian title besides the Hebrew); recently I found that this text had already been printed in Cracow 1586 as an appendix to JONAH GERONDI's *Iggeret ha-Teshuba*. A. M. ISIS

Judah ha-Levi (*Introduction* 2, 186). JUDAH CARDINAL's version of the *Khazari* is lost except for a few extracts; recently I. SONNE discovered a few leaves in a binding and gave a specimen in *MGWJ*, 72, p. 66-70, 1928. CASSEL published IBN TIBBON's Hebrew; his 2. ed., 1869, is much improved. A revised ed. of the Hebrew with reference to the original by ZIFRINOWITCH, Warsaw, 1911. GOLDZIHER's review of HIRSCHFELDS ed. *ZDMG*, 41, 691-707, 1887 is important. Of HIRSCHFELD's English recently an unauthorised new ed. appeared in N. Y. and an authorized one revised by H. in London. JUDAH HALEVI's *Divan* ed. by H. BRODY, Berlin, 1894-1903 in four vols.; the notes to III-IV are still outstanding. JULIUS GUTTMANN, Das Verhältnis von Religion und Philosophie bei JEHUDA HALEWI in *Festschrift für Israel Lewy*, 327-58, Breslau, 1911; M. KÖNIG, *Die Philosophie des Jehuda Halevi und des Abraham ibn Daud*, Berlin, 1929. Perhaps D. KAUFMANN, JEHUDA HALEWI, Breslau, 1877 (*Ges. Schriften*, 2, 99-151, 1910) might have been mentioned. A. M. ISIS

Moses ibn Ezra (*Introduction* 2, 185). A complete Hebrew translation of the *Muhadarat* by B. HALPER, *Shirat Yisrael*, Leipzig, 1924. A

very important review of it by SIMHONI in *Ha-Tekufah*, 23, 491-500, 1925. M. MILLÀS, *Un capitulo del Libro de Poetica de Mose Avenezra*, Madrid, 1930.

The *Tarshish* is a collection of poems ending in homonyms (Later poets like HARIZI and TODROS ABULAFIA composed similar works based on homonyms that hat escaped M. IBN E. BRODY has published numerous poems from the *Divan* in various places since 1896. The first vol. of a complete edition by RAVNITZKY and BIALIK appeared Tel Aviv 1928. BRODY who criticised this edition severely has a new edition in the press.

BACHER, Ein unbekanntes Werk MOSES IBN ESRA's (on the nativity of MOSES) *MGMJ*, 51, 343-9, 1907). A. HARKAVY, Aus dem Original von MOSE IBN ESRA's *Arugat ha-Bosem*, *MGWJ*, 43, 133-36, 1899. A. M. ISIS.

Pedro Alfonso (*Introduction* 2, 200). JOS. ÖSTERREICHER, *Die Gespräche des Petrus Alfonsi und ihre haggadischen Bestandteile*, Gösling, 1903. A. M. ISIS

Tūmart, Ibn (*Introduction* 2, 165). Add to the bibliography. I. GOLDZIHER: *Le livre de Moh. ibn Toumert* (Alger, 1902) with an introduction of over 100 p. A. M. ISIS

XIIth Century (second half)

Krueger, Hilmar C. Genoese trade with northwest Africa in the twelfth century. *Speculum*, 8, 377-95, 1933. ISIS

Mainz, Ernst. Zum arabischen Sprachgebrauch des MAIMONIDES. *Islamica*, 5, 556-72, 1932. ISIS

Munro, Dana C.; Haagensen, Cushman D. Arabian medicine as represented in the memoirs of USĀMAH IBN MUNQIDH. *Annals of Medical History*, 5, 226-35, 1933. ISIS

Richard Fitzneal (*Introduction* 2, 467). RICHARD ELYS, Gemäss *Libri Sale Catalogue* hat er einen *tractatus de spera* und wohl auch *de astrolabio* verfasst. E. Z. ISIS

(Rushd, Ibn). AVERROÈS. Talkhiç kitab al-maqoulat. Texte arabe inédit publié avec une recension nouvelle du Kitab al-maqoulat (catégories) D'ARISTOTE. XL+183 p. (*Bibliotheca arabica scholasticorum*, série arabe, T. 4). Beyrouth, Imprimerie catholique, 1932. ISIS

Édition critique de la paraphrase des Catégories d'ARISTOTE. Composée par IBN RUSHD vers 1168 " plusieurs dizaines d'années après les travaux des logiciens latins ABAILARD (m. 1142) et GILBERT DE LA PORRÉE (m. 1154), elle n'excita guère la curiosité des Scolastiques, familiarisés d'ailleurs depuis longtemps avec le commentaire légué par BOECE (m. 524) aux écoles latines du haut Moyen âge. Elle eut une certaine notoriété chez les Juifs, puisqu'une version hébraïque, faite dans le premier tiers du treizième siècle, eut l'honneur d'être commentée, cent ans plus tard, par le philosophe juif LÉVI BEN GERSON (m. 1344). Elle fut également traduite en latin, et dès la fin du XV^e^ siècle elle entra dans les éditions d'ARISTOTE-AVERROÈS. Mais les grands Scolastiques du XIII^e^ siècle ne la citent pas. Dans le monde arabe elle fut bientôt négligée, partageant le sort des œuvres philosophiques qui se ressentaient davantage de leur origine grecque." (p. V). Nous avons déjà signalé l'importance de cette admirable collection qui fait honneur non seulement à l'auteur mais aussi à l'Université Saint-Joseph de Beyrouth (voir *Isis*, 10, 497-9; 19, 257). G. S.

Seddon, C. N. Note on certain words in the *Chahār Maqāla*. *Journal of the Royal Asiatic Society*, 687-90, 1933. ISIS

(Usāmah ibn Munqidh). USĀMAH's memoirs entitled *Kitāb al-I'tibār* by USĀMAH IBN MUNQIDH; Arabic text edited from the unique manuscript in the Escurial Library, Spain, by PHILIP K. HITTI. XLIII+240 p., 1 pl. (Princeton Oriental texts, 1). Princeton University Press, 1930. ISIS

Reviewed by WILLIAM THOMSON, *Isis*, 15, 341-42, 1931.

Zinner, E. Die astronomischen Kenntnisse des Stern-Odde. *Mannus, Zeitschrift für Vorgeschichte*, 25, 301-06, 1933. ISIS

" Die Lebenszeit ODDES lässt sich daraus erschliessen, dass die älteste Handschrift, die wohl nur die Abschrift der Urschrift war, um 1200 oder kurz zuvor entstanden ist, und dass BECKMAN dem Inhalt entnehmen konnte, dass die Urschrift in der Zeit von 1133-87, wahrscheinlich vor 1173 entstanden ist. ODDE selbst, auch Stern-Odde und Sohn des Helgi genannt, war Knecht bei Tord auf Muli, mit ungefähr 65° 45' Polhöhe, und zeitweise Fischer auf Flatö, mit 66° 15' Polhöhe; er kannte sich besser im Kalender aus als seine isländischen Zeitgenossen und sah nach den Sternen. Vermutlich war es sein Sohn, der Gesetzesmann Styrkarr ODDASON, der um 1187 auf Muli lebte. Demnach scheint ODDE dem 12. Jahrh. anzugehören." " Wenn also unsere Untersuchung der 3 dem ODDE zugeschriebenen Abschnitte keinen Beweis dafür zu erbringen vermag, dass es auf Island eine vorkirchliche Astronomie gab, die in ihren Methoden und Ergebnissen der frühmittelalterlichen Astronomie des Abendlandes überlegen war, so soll andererseits nicht verkannt werden, dass die Isländer bereits im 12. Jahrh. sich bemühten, sich das Wissen des christlichen Abendlandes zu erwerben und, auf ihre Art, beobachtend an die Natur heranzutreten."

XIIIth Century (whole and first half)

'Arabī, Ibn (*Introduction* 2, 596-7). The strange diagrams used by RAMON LULL in his *Ars magna* were anticipated by IBN 'ARABĪ. See CARRA DE VAUX: *Penseurs de l'Islam* (vol. 4, 224-5, 1923).
G. S. ISIS

Asín Palacios, Miguel. Vidas de santones andaluces. La " Epístola de la santidad " de IBN 'ARABĪ DE MURCIA. 201 p. *(Escuelas de estudios árabes de Madrid y Granada)*. Madrid, ESTANISLAO MAESTRE, 1933. (8 pesetas) ISIS

DON MIGUEL, who has already devoted many important studies to his Muslim countryman, MUḤAMMAD IBN 'ALĪ IBN 'ARABĪ of Murcia (see my *Introduction*, 2, 596-8), has now translated a text hitherto unpublished: IBN 'ARABĪ's *Risālat al-quds* (Escorial 741). That treatise was addressed by IBN 'ARABĪ from Mecca 1203 to a Tunis friend, the ṣūfī ABŪ MUḤAMMAD 'ABD AL-'AZĪZ. The *Epistola de la santidad* is apparently an abridgment of the *Precious pearl (Al-durra al-fākhira)*. It is divided into four parts: 1. Survey of spiritual life in the East, chiefly Mecca and Egypt; the author contrasts oriental corruption with the sanctity which he had witnessed so abundantly in Andalusia. 2. His own spiritual confession in the form of a dialogue between himself and his soul. 3. (This is by far the most important part; it forms the main substance of this vol., p. 51-186). More than fifty biographies of Andalusian saints and wise men: this is a very precious contribution to the study of religious life in Spain and Africa at the end of the twelfth century. 4. Epilogue. Index. G. S.

Birkenmajer, Alexandre. Découverte de fragments manuscrits de DAVID DE DINANT. *Revue néoscolastique de philosophie*, 35, 220-29, 1933. ISIS

" Malgré les travaux assez nombreux qu'on lui a consacrés, DAVID DE DINANT reste encore un des personnages les plus mystérieux du début du XIII^e siècle. La raison principale en est que ses ouvrages ont été condamnés au feu par le concile provincial tenu à Paris en 1210. Le décret ' insistait pour que les *quaternuli* de DAVID fussent apportés à l'évêque de Paris, avant la Noël, afin d'être brûlés; quiconque les conserverait après ce temps, serait excommunié '." (Voir aussi mon *Introd.*, II, 551). L'auteur a trouvé quatre séries manuscrites de fragments de DAVID et il en prépare une édition qui formera un fascicule des " *Philosophes belges*." G. S.

Bratianu, G. I. Recherches sur le commerce génois dans la Mer Noire au XIII^e siècle. XII+359 p., 5 pl., 1 map. Paris, GEUTHNER, 1929. ISIS

Important review by PAUL PELLIOT, *T'oung Pao*, 27, 203-11, 1930.

Fāriḍ al-dīn 'Aṭṭār (*Introduction* 2, 601). Apropos of the strange

astronomical ideas of his *Asrār nāmeh*, see HOAYNE-AZAD : *L'aube de l'espérance* (Leiden, 1909) and CARRA DE VAUX : *Penseurs de l'Islam* (4, 310-11, 1923). G. S. ISIS

Grayzel, Solomon. The Church and the Jews in the XIIIth century. A study of their relations during the years 1198-1254, based on the Papal letters and the Conciliar decrees of the period. IX+377 p. Philadelphia, Dropsie College, 1933 (paper bound $3.00, cloth bound $3.50). ISIS

Part I : The relation between the Church and the Jews during the years 1198-1254. 1. The importance of the thirteenth century; 2. The sources; 3. The Papal attitude; 4. The Church and Jewish converts; 5. The defense of Christianity; 6. The Jews and general Church policy; 7. The policy of degradation; 8. The extent of Papal protection; 9. Conclusion. Part II. The text and translation of the Papal letters; The text and translations of the Conciliar Decrees; Appendix; Bibliography.

Husain, Yusuf. Ḥauḍ al-ḥayāt. La version arabe de l'Amratkund. *Journal asiatique*, 213, 291-344, 1928. ISIS

" Dès que les Musulmans eurent conquis l'Inde septentrionale, au commencement du XIII^e siècle, ils entreprirent de traduire dans leurs langues, l'arabe ou le persan, les œuvres principales de la littérature et de la philosophie hindoues. Ils sentaient le besoin, pour mieux gouverner, de bien comprendre et apprécier la vie et la pensée hindoues. L'ouvrage que l'on publie ici est l'une de ces œuvres. L'Amratkund, ou ' la citerne de l'eau de la vie ' est relative aux principes du yoga, une des six écoles de la philosophie hindoue, comme moyens de comprendre la réalité. L'auteur, en partie, traite du quiétisme et de la contemplation et en partie des croyances superstitieuses, talisman et amulettes. L'ouvrage original, d'après l'introduction du livre, fut écrit en sanskrit. QĀDĪ RUKN AL-DĪN SAMARQANDĪ, qui vécut à Lakhnautī pendant le règne de Sultan 'ALĪ MARDANĪ (1207-1212), le traduisit d'abord en persan, et ensuite en arabe."

John of London (*Introduction* 2, 582). ZINNER, *Handschriften*, Nr. 4655-59 beziehen sich auf einen JOH. VON LONDON. E. Z. ISIS

John of Toledo. Zu erwähnen ist der vor 1241 gestorbene Mag. JOH. VON TOLEDO, aus England, auch " Cardinalis albus " genannt, der als Astrolog und Alchemist galt (HERMANN GRAUERT, Meister JOHANN V. TOLEDO. *Sitz.-Ber. Bayr. Akad. phil.-hist. Kl.*, München, 1901). E. Z. ISIS

Thomson, S. Harrison. The text of GROSSETESTE's *De cometis*. *Isis*, 19, 19-25, 1933. ISIS

New edition superseding the imperfect one given by LUDWIG BAUR in 1912. G. S.

William the Englishman (*Introduction* 2, 620). Wilhelmus Anglicus hat gemäss Handschrift XIV. Jahrhundert in R. Observatory Edinburgh Tafeln für Marseille ab 1160 verfasst, sodass er wohl dem XII. Jahrhundert angehört. E. Z. ISIS

Wilson, E. Faye. The *Georgica spiritualia* of JOHN OF GARLAND. *Speculum*, 8, 358-77, 1933. ISIS

XIIIth Century (second half)

Alfonso el Sabio (*Introduction* 2, 837). Die "so-called Alphonsine Tables" sind in Paris um 1300 hergestellt und zeigen eine ganz andere Struktur als die ursprünglichen Tafeln. E. Z. ISIS

Anianus (*Introduction* 2, 992). Zu der Behauptung dass der Druck des *Compotus* des ANIANUS der älteste Druck sei, s. HOUZEAU I 12959 : *Amadus Derthonensis Computus* 1479 und HOUZEAU I 13009 : *Joh. Italus Computus* 1483. E. Z. ISIS

Antuña, Melchor M. Una versión árabe compendiada de la 'Estoria de España' de ALFONSO EL SABIO. *Al-Andalus*, 1, 105-54, 1933. ISIS

Apropos of an Arabic summary of the *Estoria de España* by IBN AL-KHAṬĪB (1313-74) of Loja (near Granada) who composed it at the very end of his life. G. S.

Calverley, Edwin E. AL-ABHARĪ's "Isāghūjī fi l-Manṭiq." MACDONALD presentation vol., 75-85, 1933. ISIS

Analysis of that treatise which is still used as a textbook on logic in the Islamic world of to-day. (SARTON's *Introduction*, 2, 867). G. S.

Foster, Mary Louise. A thirteenth century book on stones. *Jour. Chem. Education*, 10, 369-72, 1933. ISIS

Account of a *Lapidary* of ALFONSO EL SABIO, 1278, the original manuscript of which is in the Library of San Lorenzo in the Escorial. T. L. D.

Guerra, Giorgio del. ALESSANDRO DELLA SPINA inventore o primo preparatore di occhiali. *Atti della soc. ital. di storia delle scienze mediche*, IV. congr., 13-18, 3 facs., 1933. ISIS

See SARTON's *Introd.* 2, 1024-25. Portrait and facsimiles. The author concludes in his favor "A lui dunque, felice di alleviare la presbiopia dei confratelli e dei cittadini suoi, l'onore che la falsa erudizione gli contestò per più secoli." (p. 18). G. S.

Jacob ben Maḥir ibn Tibbon (*Introduction* 2, 850). Es handelt sich

nicht um Tafeln sondern um ein Jahrbuch *(ephemeris, almanach)* beginnend mit 1300. E. Z. ISIS

Kuo Shou-ching (*Introduction* 2, 1022). Die vollständigste Beschreibung der alten von KUO SHOU-CHING stammenden Instrumente befindet sich in meiner *Geschichte*, S. 235-37. Ihr Kennzeichen sind die Wasserrinnen und die Doppelkreise. Vielleicht wäre es nötig bei der Wegnahme einiger dieser Instrumente zu erwähnen, dass die besten Aufnahmen dieser und der 3 nach Potsdam geschafften Jesuiten-Instrumente von deutscher Seite gemacht worden und jederzeit von der Staatlichen Bildstelle zu Berlin zu beziehen sind, und dass nach der Rückkehr der Instrumente nach Peking kein Chinese und kein Ausländer (Engländer, Amerikaner oder Franzose) fähig war sie richtig aufzustellen und dass deshalb ein Deutscher sie in Ordnung brachte. Hoffentlich haben jetzt die Chinesen mehr Verständnis für ihre Schätze. Ob diese alten chinesischen Instrumente wirklich die Einteilung in 365 1/4° zu 100' zu 100" besassen, kann ich jetzt nicht nachprüfen ; eine so weit gehende Unterteilung kommt mir sehr unwahrscheinlich vor. E. Z. ISIS

Millàs Vallicrosa, J. El literalismo de los traductores de la corte de ALFONSO EL SABIO. *Al-Andalus*, 1, 155-87, 1933. ISIS

On the literal faithfulness of the Alfonsine translations from the Arabic. By way of illustration, the author gives the Arabic text and the Alfonsine Spanish translation of extracts from AL-ZARQĀLĪ's treatise on his astrolabe *(saphaea Arzachelis)*, to wit, the prologue, the table of contents, and chapters 1 and c. G. S.

Moule, A. C. A MARCO POLO translation. *T'oung Pao*, 29, 111-14, 1932. ISIS

Pelliot, Paul. Le prétendu mot "iascot" chez GUILLAUME DE RUBROUCK. *T'oung Pao*, 27, 190-92, 1930. ISIS

Ramon Lull (*Introduction* 2, 901). Discovery of the *Ars magna*. The diagrams used by LULL were anticipated by MUḤAMMAD IBN 'ALĪ IBN 'ARABĪ. See CARRA DE VAUX : *Les Penseurs de l'Islam* (vol. 4, 224-5, 1923). G. S. ISIS

Strunz, Franz. Les sciences naturelles dans l'œuvre d'ALBERT LE GRAND. *Annales Guébhard-Séverine*, 8, 245-63, 1932. ISIS

Étude d'ensemble suivie d'une bibliographie, publiée sous les auspices de l'Institut Guébhard-Séverine (4, rue du Seyon, Neuchâtel, Suisse) qui en donnera volontiers un exemplaire gratuit à quiconque en fera la demande. G. S.

Ullman, B. L. A project for a new edition of VINCENT OF BEAUVAIS. *Speculum*, 8, 312-26, 1933. ISIS

Zinner, E. PETRUS DE DACIA, en middelalderlig dansk astronom. *Nordisk astronomisk tidsskrift*, 13, 136-46, 1932. ISIS

XIVth Century (whole and first half)

Daland, Judson. The evolution of modern printing and the discovery of movable metal type by the Chinese and Koreans in the fourteenth century. *Journ. of the Franklin Institute*, 212, 209-34, 1931. ISIS

Reviewed in *T'oung Pao*, 29, 164, 1932.

Dante. De la monarchie. Introduction et traduction de B. LANDRY (*Textes et traductions pour servir à l'histoire de la pensée moderne*, collection dirigée par ABEL REY). VIII+196 p. Paris, ALCAN, 1933. ISIS

Voici qui indiquera dans quel esprit est rédigée l'introduction de LANDRY, introduction qui occupe presque la moitié du volume :

" C'est comme penseur du moyen âge qu'il faut, croyons-nous, étudier DANTE; et cet aspect révélera, peut-être, avec plus de clarté, la grande modernité du Poète philosophe. Afin de mieux pénétrer dans cette pensée qui, à tant de points de vue, nous demeure difficile, nous commencerons par jeter un coup d'œil rapide sur les doctrines politiques en honneur à l'époque où écrivait DANTE. Nous ne nous demanderons pas si DANTE a influé sur JEAN DE PARIS et ENGELBERT D'ADMONT, ou réciproquement; cette question supposerait résolu l'insoluble problème de la date de composition [du *De Monarchia*]; mais nous prendrons JEAN, ENGELBERT et GILLES DE ROME comme les témoins et les défenseurs de traditions multiples; bref nous voudrions esquisser les trois principales thèses qui se partagaient les esprits au début du XIV^e^ siècle : le monisme papal, le monisme impérial, les nationalismes naissants. Nous comprendrons mieux ensuite la pensée originale de DANTE."

Datta, Bibhutibhusan. The algebra of NĀRĀYAṆA. *Isis*, 19, 472-85, 1933. ISIS

" NĀRĀYAṆA is the author of two works : (1) an arithmetical treatise, the *Gaṇita-pāṭi-Kaumudī* or simply the *Gaṇita-Kaumudī* (or " Elucidation of Arithmetic ") and (2) a treatise on algebra, the *Bīja-gaṇitāvataṁsa* (or " Ornament of Algebras "), which is the subject of this paper. He is said to have also written a commentary on the *Līlāvatī* of BHĀSKARA II..."

" NĀRĀYAṆA has divided his treatise on algebra broadly into two parts. The first part is devoted to the treatment of what have been called by BHĀSKARA II ' the instruments of analysis,' namely, laws of signs, arithmetic of zero, operations with unknowns, surds, pulveriser (or indeterminate analysis of the first degree), the square-nature (or the so-called Pellian equation) and the cyclic method. The second part deals with analysis proper, that

is, the solution of equations..." "The space allotted to the treatment of each topic will be seen from the following synopsis of the work."

Falco, Vittorio De. Altri scolii di GIOVANNI PEDIASIMO agli *Analitici*. *Byzantinische Zeitschrift*, 28, 251-69, 1928. ISIS

Guilland, Rodolphe. La correspondance inédite de NICOLAS CABASILAS. *Byzantinische Zeitschrift*, 30, 96-102, 1929-30. ISIS

Somogyi, Josef von. Ein arabisches Kompendium der Weltgeschichte das *Kitāb duwal al-Islām* des ADH-DHAHABĪ. *Islamica*, 5, 334-53, 1932. ISIS

Soulier, G. Le moine arménien HETHOUM et les apports d'Extrême-Orient à la fin du XIII^e^ et au commencement du XIV^e^ siècle. *Rev. des études arméniennes*, 10, 249-54, 1929. ISIS

Reviewed in *T'oung Pao*, 27, 448-49, 1930.

Tatlock, John S. P. MOHAMMED and his followers in DANTE. *Mod. Lang. Rev.*, 4 p., 1933. ISIS

"DANTE shows much the same view of the Mohammedans as his contemporaries, and it is a low and negligent one. Certain of them, it is true, he ranges among his great men; accepting the general opinion, he twice mentions SALADIN in the best of company, many times he quotes six Arabic philosophers with high respect but without reference to their racial religion, and it is merely as great philosophers that with rare tolerance he puts AVERROES and AVICENNA in Limbo. The Saracens form a sect apart, like the Jews, Christians, 'gentili,' even 'filosofi'; sometimes they are grouped especially with the Jews, but never with the Christians. They are treated as more alien than the Jews, and with much more antipathy; the poet's own feeling presumably is expressed by his crusading ancestor CACCIAGUIDA—'gente turpa,' 'la nequizia di quella legge.' All this is quite what we find in dozens of practical and informed writers before DANTE's day and long after."

Vanhée, L. (S. J.) Le précieux miroir des quatre éléments. *Asia major*, 7, 242-70, 1931. ISIS

Analysis of the *Ssŭ-yüan yü-chien* composed in 1303 by CHU SHIH-CHIEH. Says Father VANHÉE: "TCHOU CHE-KIÉ publia vers 1303 son algèbre à 4 inconnues, décorée du nom fleuri de *Précieux miroir des quatre éléments*. L'ouvrage, outre une espèce d'introduction fort intéressante, est divisé en trois chapitres qui contiennent 288 problèmes, dont plusieurs très compliqués. Le *Précieux Miroir* fut perdu toute une longue série d'années. YUEN YUEN (1764-1849) au moment où il commençait ses *Biographies de Mathématiciens* (*Isis*, 8, 103-18) n'avait pas encore réussi à le retrouver. En 1802, LOU MING-HIANG plus heureux découvrit enfin un vieil exemplaire, qu'il se mit à étudier avec une ardeur soutenue. En 1836, par la protection et sous le patronage de l'illustre YUEN, parut le premier fruit de ses longs travaux: *Le précieux*

miroir avec explications détaillées. La même année, LO donnait un ouvrage spécial en 24 fascicules intitulé *Explications et règles de l'algèbre quadrilittérale*, qui dénotent un travailleur infatigable et consciencieux. TING, dans son recueil, fit une place d'honneur au texte retrouvé et corrigé par de si habiles mains : il publia l'ouvrage de TCHOU dans son entier, sans aucune note postérieure." G. S.

XIVth Century (second half)

Asín Palacios, Miguel. Un precursor hispanomusulmán de San JUAN DE LA CRUZ. *Al-Andalus*, 1, 7-79, 1933. ISIS

Apropos of ABŪ 'ABDALLĀH MUḤAMMAD IBN 'ABBĀD of Ronda (born in Ronda 1332, died 1390), mystic poet who wrote a commentary on the *Kitāb al-ḥikam al-'Aṭa'īyat* of AḤMAD IBN MUḤAMMAD IBN 'AṬĀ'ALLĀH AL-SHĀDHILĪ of Alexandria (d. 1309 Cairo). DON MIGUEL has used an edition of his *Sharḥ ḥikam* dated Cairo 1324. I suppose the author is identical with the commentator named MUḤAMMAD IBN IBRĀHĪM AL-NAFZĪ AL-RUNDĪ in earlier editions of *al-ḥikam-al-'aṭā'īyat* (Bulaq 1869, 1872). DON MIGUEL gives an account of his life and his mystical doctrines which anticipate to a certain extent those of San JUAN DE LA CRUZ. This elaborate study is followed (p. 37-79) with a number of extracts from the *Sharḥ ḥikam* in Spanish translation. G. S.

Bouthoul, Gaston. IBN-KHALDOUN. Sa philosophie sociale. 94 p. Paris, GEUTHNER, 1930. ISIS

Moule, A. C. An introduction to the *I Yû T'u Chih*, or "Pictures and descriptions of strange nations" in the Wade collection at Cambridge. *T'oung Pao*, 27, 179-88, 1930. ISIS

"It will be seen from the foregoing notes that the *I yü t'u chih* was compiled some time early in the Ming dynasty, between 1392 and 1430, and was reprinted, or possibly printed for the first time, in 1489 by CHIN HSIEN, to whom the author and date were quite unknown."

Somogyi, Joseph de. Index des sources de la *Ḥayāt al-ḥayawān* de AD-DAMĪRĪ. *Journal asiatique*, 213, 5-128, 1928. ISIS

Stein, I. H. Another "lost" chapter of WYCLIF's *Summa de ente*. *Speculum*, 8, 254-55, 1933. ISIS

Windler, Ernst. Das Bremer mittelniederdeutsche Arzneibuch des ARNOLDUS DONELDEY. Mit Einleitung und Glossar. XV+83 p. (*Niederdeutsche Denkmäler*, hrsg. vom Verein für niederdeutsche Sprachforschung, 7). Neumünster, WACHHOLTZ, 1932. ISIS

ARNOLDUS DONELDEY belonged to a patrician family of Bremen, many members of which were burgomasters or councilmen in the thirteenth and fourteenth centuries. He was the son of ALBERO DONELDEY, and was born c. 1342;

he became a trustee of the St. Jürgen hospital and thus became interested in medical matters; he married a woman called GHEZE and died between 1387 and 1398. The ms. of his *Arzneibuch* was completed in 1382. WINDLER's work completes the one begun by FRANZ WILLEKE in his Munich thesis of 1912 : *Das Arzneibuch des Arnoldus Doneldey*. WILLEKE was a victim of the war. The introduction discusses the Ms. (Staatsarchiv zu Hannover), then the sources of the text. " Als gesichertes Ergebnis der Untersuchung können wir feststellen, dass das *Arzneibuch* des ARNOLDUS DONELDEY eine Sammelhandschrift ist, die aus verschiedenen, zum grösseren Teil hochdeutschen Quellen geschöpft hat, von denen die wichtigste der hochdeutsche BARTHOLOMAEUS ist. Aus dem Hochdeutschen stammt auch die Lehre von den zwölf Monaten." (p. XIII). A third chapter of it deals with the relationship of the middle-nether-German pharmacopoeias to mediaeval medical literature. WILLEKE compared the present *Arzneibuch* with those of Utrecht, Wolfenbüttel, and Gotha. " WILLEKE hat mit seinen Untersuchungen bewiesen, dass die mittelniederdeutsche Arzneikunde in sehr starkem Masse von hochdeutschen Arzneilehren, besonders von der berühmtesten, der des Meisters BARTHOLOMAEUS, beeinflusst ist. Seine Annahme eines zweiten ursprünglich hochdeutschen Arzneibuches dagegen, das den Kern des Utrechter und eines Teiles des Bremer Arzneibuchs bilden soll, steht nicht auf sehr starken Füssen und erscheint nach Norrboms oben erwähnten Darlegungen von der Entstehungsweise der mittelalterlichen Arzneibücher nicht mehr haltbar." (p. XV).

The text covers 68 closely printed pages, and is followed by a glossary (p. 70-83). Reviewed by P. DIEPGEN in *DLZ*, 4, 1144-46, 1933. G. S.

XVth Century (whole and first half)

Durand, Dana B. The earliest modern maps of Germany and Central Europe. *Isis*, 19, 486-502, 3 pl., 1933. ISIS

Apropos of the Munich MS (Clm. 14583) formerly in the Benedictine monastery of St. Emmeran, Regensburg. " The examination of this manuscript indicates the existence of a scientific movement hitherto unnoticed in the history of geography. The traditional priority of REGIOMONTANUS and the Nürnberg school is seen to be gratuitous, and increasing importance must be attached to the astronomical centers of Vienna and Prague and the activities of the south German Benedictines. The date of the earliest modern maps of North European nations can now be placed with certainty in the first half of the 15th century, perhaps as early as the third decade. Nor is it enough to invoke the influence of PTOLEMY (though that was certainly present to a degree) nor of Italian humanism to account for the rise of this cartography. While it is doubtless true that Italy was the first country to achieve a partial delineation of its own geography, it is also probable that Bavarian-Austrian learning in the person of NICOLAUS GERMANUS contributed much to its scientific completion. The traditional line between southern enlightenment and northern barbarism, between Renaissance science and medieval ignorance is shown in this particular case to have been largely fictitious." (p. 500).

Roncière, Charles de la. La découverte de l'Afrique au moyen âge.

Cartographes et explorateurs. Tome troisième : Un explorateur français du Niger. VIII+129 p., pl. (*Mémoires de la société royale de géographie d'Egypte*, 13). Le Caire, 1927. ISIS

Contents : Une idylle franco-nègre dans la boucle du Niger (1405-1413); La succession de l'explorateur du Touat, le Génois ANTONIO MALFANTE; Les centurions de Gènes, commanditaires de MALFANTE; CHRISTOPHE COLOMB et le périple de l'Afrique; Un nouveau document sur le sanatorium de " L'isle vert " : LOUIS XI croyait bien avoir la lèpre; Un artiste italien à la cour d'Abyssinie au XV^e^ siècle : BRANCALEONE; La liaison établie entre Rome et l'Abyssinie (1481-83).

XVth Century (second half)

Almagià, Roberto. Ciò che è definitivamente acquisito alla scienza e ciò che ancora può essere utilmente indagato intorno alla vita, ai viaggi ed alle scoperte di CRISTOFORO COLOMBO ed alle conseguenze di esse riguardo al progresso delle conoscenze geografiche. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 256-67, 1933. ISIS

Balsac, Robert de. L'hôpital. Translated by MICHEL PIJOAN. *Bulletin of the Institute of the History of Medicine*, 1, 118-25, Baltimore, 1933. ISIS

" The exact dates of Monseigneur ROBERT DE BALSAC could not be traced through the ordinary cryptic channels of the penitential searching or references. It is known, however, on the fairly good authority of ALLUT, that BALSAC served as a nobleman warrior par excellence, in 1471 under LOUIS XI, and that, under CHARLES VIII he was made the high commandant of the citadel of Pisa. It is obvious that his treatise ' L'Hôpital ' was the common-sense approach, mingled with running wit, of his visitations to the poor unfortunates, soldiers, and diseased who filled the institutions of charity to the brim. The treatise was published by the famous Dr. SYMPHORIEN CHAMPIER of Lyons in 1503 as a final chapter and addenda to his book ' The cloister of princes.' "

Birkenmajer, Alexander. Formula. *Isis*, 19, 364-78, 1933. ISIS

Dealing largely with JOHANN VIRDUNG of Hassfurt in Lower Franconia (b. c. 1465—d. c. 1535). " Uebrigens ist VIRDUNG keineswegs der erste gewesen, der die Gleichung *formula* = *regula* in allgemeinen aufgestellt hat." " Bei VIRDUNG stammt also das Wort, unmittelbar oder mittelbar, aus der Lekture der Klassiker (nicht aber des BOETIUS) her. Hat er es vielleicht zum ersten Male in Krakau kennengelernt, als er hier unter ALBERTUS DE BRUDZEWO, dem Freunde des Humanisten KONRAD CELTES, studierte ? "

Butler, Pierce. Fifteenth century editions of Arabic authors in Latin

translation. MACDONALD presentation vol., 63-71, 4 pl., Princeton, N. J., 1933. ISIS

Followed by a note on the earliest printing of Arabic. G. S.

Columbus, Christopher. Documents and proofs of his Genoese origin. English-German edition. XXIII+288 p., pls., facs. City of Genoa, 1932. ISIS

Folio volume published by the City of Genoa to establish finally COLUMBUS' Genoese origin. All the documents are magnificently reproduced in facsimile and all necessary information concerning them is given briefly and clearly. The work has been compiled by Prof. GIOVANNI MONLEONE, assisted by Dr. GIUSEPPE PESSAGNO. The documents are divided into three groups: "1. Attestations of contemporaries (writers of every nationality, some of them personal friends of COLUMBUS; diplomats of his day) who, together with the Genoese historians, echoed the voice of public opinion in attesting Genoa to be the Navigator's country; 2. The notarial deeds and other official documents kept in Ligurian archives, which contain reliable information on COLUMBUS and his family. To these deeds must be added important information such as that given by the companions of his travels and by other persons in close touch with the Discoverer; 3. CHRISTOPHER COLUMBUS's personal deeds (his autographs, his Book of Privileges, his wills and other papers) and the deeds of his relatives and descendants."

Two other editions have been published of the same work: the original edition in Italian, and another in French and Spanish. G. S.

Lebègue, Raymond. L'histoire de l'humanisme de la Renaissance. *Bulletin of the international committee of historical sciences*, 5, 174-79, 1933. ISIS

Münster, Ladislao. ALESSANDRO ACHILLINI, anatomico e filosofo, professore dello Studio di Bologna (1463-1512). *Rivista di storia delle scienze*, 24, 7-22, 54-77, 7 figs., 1933. ISIS

Newton, Arthur Percival. The great age of discovery. XII+226 p. London, University Press, 1932. ISIS

Reviewed by G. R. CRONE, *Geographical Journal*, 80, 260-1, 1932.

Polain, Louis. Catalogue des livres imprimés du XV^e^ siècle des bibliothèques de Belgique. 4 vols. XXX+772+748+795+600 p., ill. Bruxelles, Soc. des bibliophiles et iconophiles de Belgique, 1933. ISIS

Vecchi, Bindo de. Les livres d'un médecin humaniste florentin du XV^e^ siècle. Des "Ricordi" de Maestro ANTONIO BENIVIENI. *Janus*, 37, 97-108, 1933. ISIS

Leonardo da Vinci

Johnson, M. C. LÉONARD DE VINCI et les manuscrits d'ARCHIMÈDE. Note sur la transmission de la culture scientifique de l'antiquité. *Scientia*, 53, 213-17, 1933. ISIS

La première édition des œuvres d'ARCHIMÈDE a été publiée vingt-cinq ans après la mort de LÉONARD. " Les principales sources archimédiennes de LÉONARD provenaient probablement de la collection constituée par LÉON à Constantinople au IX^e^ siècle, collection qui comprenait la version faite du dorique d'ARCHIMÈDE par ISIDORUS " au début du VI^e^ siècle. Il est possible que LÉONARD ait eu également connaissance des traductions latines de l'arabe faites sur des textes grecs ou syriaques au IX^e^-X^e^ siècle. Tableaux synoptiques très clairs de la transmission géographique et de la transmission linguistique des œuvres d'ARCHIMÈDE. L. G.

XVIth Century (whole and first half)

A. — *Mathematics*

Bortolotti, Ettore. La matematica in Italia nel secolo XVI. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 268-83, 1933. ISIS

Vera, Francisco. Fr. JUAN DE ORTEGA y los números irracionales. *Archeion*, 14, p. 554, 1932. ISIS

B. — *Physical sciences and technology*

Darmstaedter, Ernst. PARACELSUS, De natura rerum. Eine kritische Studie. *Janus*, 37, 1-18, 48-62, 109-15, 1933. ISIS

Vetter, Quido. 'NIKOLAS KOPERNIK et la Bohême.' *Bulletin scientifique de l'Ecole polytechnique de Timisoara*, 4, 292-94, 1932. ISIS

A communication made to the International congress of mathematicians at Zürich in 1932. R. C. A.

C. — *Natural sciences*

Barlow, Roger. A briefe summe of geographie. Edited by E. G. R. TAYLOR. LVI+210 p. (*Works issued by the Hakluyt Society*, vol. 69, second series). London, Hakluyt Society, 1932. ISIS

Reviewed by G. R. CRONE, *Geographical Journal*, 80, 354, 1932. A hitherto unpublished manuscript translation (1540) of ENCISO's " Suma

de geographia " (Seville, 1519) by BARLOW, who sailed with CABOT in 1526 to the River Plate. The earliest English account of America. ENCISO, from his knowledge of tropical conditions, was able correctly to explain the cause of the Nile floods. BARLOW had first-hand experience of the shifting equatorial wind-belts. C. W. A.

Heawood, Edward. The chart-maker LOPO HOMEM. *Geographical Journal*, 80, 91-2, 1932. ISIS

Further notes on the question whether there were two men of this description and name. C. W. A.

D. — *Medical sciences*

Feder, K. ; Soltau, Krs. Die Krankheitslehre des PARACELSUS in Praxis und Theorie, ein Experimentalbeweis für die alte Philosophie Asiens. *Ex Oriente*, 2, 66-71, 1926. ISIS

Sudhoff, Karl. GIROLAMO FRACASTORO und BERNARDO RAMAZZINI. Aus der Ehrenhalle grösser Aerzte im deutschen Hygiene-Museum zu Dresden, I. *Fortschritte der Medizin* 50, June 1932. ISIS

Sudhoff, Karl. Neues vom " Schielhans," dem Verfasser des " Feldbuchs der Wundarznei " 1517. *Zentralblatt für Chirurgie*, no. 23, p. 1410-11, 1932. ISIS

Sudhoff, Karl. PARACELSUS und GOETHE. *Die Medizinische Welt*, Nr. 39, 12 p., 1932. ISIS

Sudhoff, Karl. PARACELSUS im heutigen Sachsen, d.i. im Meissnischen, im Erzgebirge und dem nördlichen Böhmen. *Glückauf*, 53, 30-31, 1933. ISIS

Van Schevensteen. Un traité anversois sur la Suette anglaise. 25 p., 8 reproductions. Anvers, DE COKER, 1932 (plus un facsimilé intégral de 8 p. plus couverture). ISIS

Voir la note consacrée à l'auteur dans la section 51 de la présente bibliographie. Le traité en question est le Regimente derghenen dye doer Godlike verhenghenisse in der nyeuwen gruweliken plaghe der Sweetender siecten beuallen... publié à Anvers sans nom d'auteur en 1529. Il est dérivé d'un traité allemand qui parut la même année à Wittenberg. L'auteur nous donne un facsimilé intégral du texte flamand rarissime, et des extraits des trois textes allemand, latin et flamand. La suette fit rage à Anvers en septembre 1529. Cette épidémie est commémorée chaque année par une procession propitiatoire à l'intérieur de la cathédrale le quatrième dimanche de septembre. Jusqu'en 1893 il exista à Anvers une confrérie de la suette, et il existe une statue de N. D. de la Suette datant de 1708 dans le quartier populaire de St. André. G. S.

E. — *Alia*

Bailey, Moses. DAVID the Reubenite, a messianic figure in three religions. MACDONALD presentation vol., p. 33-42, Princeton, N. J., 1933. ISIS

Ford, J. D. M.; Moffatt, L. G. Letters of the Court of JOHN III, king of Portugal. The Portuguese text, edited with an introduction. XIX+169 p. Cambridge, Harvard University Press, 1933. ISIS

This is a companion volume to the letters of JOHN III edited by FORD in 1931 (*Isis*, 17, 497). The present volume contains one Spanish and 173 Portuguese letters dating from 1524 to 1562, which are valuable documents for the history of Portugal during that period. They do not concern the historian of science, but he may be interested in letter 76 " treating of measures taken to meet the threatened attack of the Moors upon Mazagão and to protect Ceuta and Tangiers, and mentioning a projected descent upon the coast of Spain by a large fleet of Algerian corsairs "; letter 73, relating to happenings in Armenia; letter 101, alluding to the earthquake of Feb. 1531. Forty-one letters are from Duke THEODOSIUS (Duque de Barcelos, and later Duque de Braganza, d. 1563) who " was a lover of learning, and had agents in various European centres to keep him informed of what was happening in the world of science and letters; he had a large library and a considerable assortment of mathematical instruments." (p. xvii). G. S.

(Guicciardini, Francesco). FRANCESCO GUICCIARDINI, diario del viaggio in Spagna. A cura di Conte PAOLO GUICCIARDINI. 123 p. Florence, LE MONNIER, 1932. ISIS

Reviewed by GERTRUDE R. B. RICHARDS, *American Historical Review*, 38, 737-39, 1933.

Wild, Laura Hulda. An observation upon TYNDALE's linguistic genius. MACDONALD presentation vol., p. 457-70, Princeton, N. J., 1933. ISIS

" It is a commonplace statement to say that the King JAMES version of the Bible is our greatest English classic and that WILLIAM TYNDALE had the greatest share in producing it. For while the scholars King JAMES gathered together consulted other versions in their compilation, TYNDALE's translation had so taken possession of Englishmen's minds that they could not escape using it as the substratum of their work. In the New Testament eighty per cent of the words are TYNDALE's and in some portions ninety per cent. TYNDALE was martyred before he had time to complete the translation of the Old Testament and COVERDALE's hand is especially apparent in the Psalms and other portions. To him is due rather than to TYNDALE the preservation of the sonorous quality of the Latinisms from the Vulgate, and a polishing touch to some of TYNDALE's rugged phrasing. Yet it was TYNDALE who did the mining in the original Hebrew and discovered that vein of gold which it is the purpose of this paper to emphasize."

XVIth Century (second half)

A. — *Mathematics*

Dijksterhuis, Eduard Jan. SIMON STEVIN und seine Bedeutung für die Geschichte der Mathematik und Naturwissenschaften. *Unterrichtsblätter f. Mathematik u. Naturwissenschaften*, 38, 148-50, 1932. ISIS

Simons, L. G. Historical notes on arithmetical division. *Scripta mathematica*, 1, 362-63, 1933. ISIS

Apropos of CLAVIUS' arithmetic of 1583 after an Italian translation of 1602. G. S.

B. — *Physical sciences and technology*

The Art of limning. Reproduced in facsimile from the original printed in London, 1573. III+foll. XII. (*Michigan facsimile series*, no. 3). Ann Arbor, EDWARDS BROS., 1932. ISIS

Reviewed by DANIEL V. THOMPSON, Jr., *Technical Studies*, 2, 35-37, 1933.

Camden, Carroll, Jr. Astrology in SHAKESPEARE's day. *Isis*, 19, 26-73, 1933. ISIS

"That astrology enjoyed its vogue during the days of SHAKESPEARE and found popular expression in almanacs and prognostications, we have ample proof. These latter certainly influenced public opinion, which in turn fostered the use of astrology in the literature and drama of the times. We have seen that so great was its popularity that scientists and scholars were in sympathy with it; that the church partly condoned it; and that the court accepted it with such avidity that it became a fad for the courtiers. Not only in England were manifestations of this pseudo-science current, but in continental countries as well. Astrology had had a following for thousands of years, and this following was no whit diminished in the days of SHAKESPEARE; the sixteenth and seventeenth centuries were a golden age for astrology just as they were for English literature."

Lippmann, Edmund O. von. Zur Kenntnis der "HOLLANDI" genannten Alchemisten. *Chemiker-Zeitung*, 57, 233, 1933. ISIS

Refutation of an article (not seen by me) by I. D. MOERMAN (1932), and reassertion of the author's earlier conclusions (1916) that the two Dutch alchemists, ISAAC HOLLANDI and his son JOHANN, fl. c. 1600—and that their activity was in any case post-Paracelsian (see *Isis*, 3, 333). G. S.

C. — *Natural sciences*

Heawood, Edward. Another LAFRERI atlas. *Geographical Journal*, 80, 521-2, 1932. ISIS

From the Milton-Abbas sale. Most of the 96 maps bear imprint of CLAUDE DUCHET, nephew of LAFRERI and part-heir to his property. The date of the collection may be tentatively placed between 1580 and 1585. C. W. A.

Heawood, Edward. Early map indexing. *Geographical Journal*, 80, 247-9, 1932. ISIS

Indexing of the maps in PTOLEMY was first done in the Basel edition of 1552 by the German grammarian CONRAD WOLFHART, known also under the Grecized form of the name, LYCOSTHENES. His name appears on the title-page as author of the index, but the lines referring to this have been either omitted by bibliographers or copied without comment, obscuring the fact that a new system of indexing, by rectangular coordinates, was here brought into use. In 1560, he added a similar index to a reprint of the desctiption of Switzerland by AEGIDIUS TSCHUDI. C. W. A.

Heawood, Edward. Reproductions of early engraved maps. 2 : English county maps in the collection of the Royal Geographical Society. With introduction and notes. II+14 p., atlas of 21 sheets. London, Royal Geographical Society, 1932. ISIS

Reviewed in *Nature*, 131, 530, 1933.

Lever, R. J. A. W. Early history of the British Solomon Islands. *Nature*, 131, 587, 1933. ISIS

" The Solomon Islands lie some five hundred miles east of New Guinea and were discovered on a voyage from Callao, Peru, in 1568 by the Spaniard, DE MENDAÑA."

D. — *Medical sciences*

Andel, M. A. van. WILLEM VAN ORANJE als patient. *Bijdragen tot de geschiedenis der geneeskunde*, 13, 105-09, 1933. ISIS

(Coiter, Volcher, 1534-1600). The " De ovorum gallinaceorum generationis primo exordio progressuque, et pulli gallinacei creationis ordine " of VOLCHER COITER. Translated and edited with notes and introduction by HOWARD B. ADELMANN. *Annals of Medical History*, 5, 327-41, 2 fig., 1933. ISIS

Deléage, E. Un apothicaire ligueur, JEAN DE LA BRUYÈRE, aïeul du grand moraliste. *Rev. d'hist. de la pharmacie*, 54-63, 1933. ISIS

JEAN DE LA BRUYÈRE, 1516-1594).

Favaro, Giuseppe. Il quarto centenario della nascita di GIROLAMO FABRICI D'ACQUAPENDENTE. *Rivista di storia delle scienze*, 24, 1-2, 1933. ISIS

" Nel corrente anno 1933 si compie con ogni verisimiglianza il quarto secolo dalla nascita del celebre anatomico e chirurgo GIROLAMO FABRICI D'ACQUAPENDENTE, Professore per cinquant' anni dello Studio di Padova. Insisto sopra tale data perchè, malgrado gli argomenti da me addotti a favore di essa ormai da un decennio, la massima parte degli storici seguita a ricordare ancora come anno di nascita del FABRICI il 1537."

Schadelbauer, Karl. LUCAS GEIZKOFLERS Erkrankung zu Strassburg und seine Behandlung durch Dr. GÜNTHER V. ANDERNACH. *Sudhoffs Archiv für Geschichte der Medizin*, 26, 195-98, 1933; LUCAS GEIZKOFLERS Dankschreiben an Dr. JOHANN FABER, *ibid.*, 198-200. ISIS

Wilbur, Earl M. FAUSTUS SOCINUS: an estimate of his life and influence. *Bulletin of the international committee of historical sciences*, 5, 48-60, 1933. ISIS

E. — *Alia*

Huguet, Adrien. JEAN DE POUTRINCOURT, fondateur de Port-Royal en Acadie, vice-roi du Canada (1557-1615). Campagnes, voyages et aventures d'un colonisateur sous HENRI IV. XI+560 p., ill. Paris, PICARD, 1932. ISIS

Johannet, René. La vie mouvementée d'un astrologue. *Revue de Paris*, 5, 909-29, 1932. ISIS

JOHN DEE (1527-1608). J. P.

Nemoy, Léon. A hitherto undescribed edition of LEON DE MODENA's " Sōd yeshārīm " (Venice 1594/5). *Jewish Quarterly Review*, 24, 49-50, facs., 1933. ISIS

Nordmann, V. A. VICTORINUS STRIGELIUS (gest. 1569) als Geschichtslehrer. XXIII+166 p. (Helsingforser Dissertation). Abo, 1930. ISIS

XVIIth Century (whole and first half)

A. — *Mathematics*

Brunschvicg, Léon. PASCAL. 86 p., 60 pl. Paris, RIEDER, 1932. ISIS

Après l'édition des œuvres complètes de PASCAL (14 vol., HACHETTE, 1904-14), menée à bien avec PIERRE BOUTROUX et FÉLIX GAZIER, L. BRUNSCHVICG avait publié en 1924 un vol. consacré au Génie de PASCAL (*Isis*, 8, 175-76); voici maintenant un charmant petit ouvrage, richement

illustré de planches toutes utiles, où la personne et la pensée de PASCAL peuvent être abordées par tous. L. G.

Dijksterhuis, E. J. DESCARTES als wiskundige. Openbare les, gegeven bij de aanvaarding van het ambt van privaat-docent in de geschiedenis der wiskunde aan de Rijksuniversiteit te Leiden op 5 October 1932. 22 p. Groningen-Batavia, NOORDHOFF, 1932. ISIS

Public lecture opening the author's course on the history of mathematics at the University of Leiden. A synthesis of DESCARTES' mathematical work. G. S.

Tannery, Mme. Paul. A propos d'une lettre de TORRICELLI. *Revue scientifique*, 71, 33-38, 3 fig., 1933. ISIS

B. — *Physical sciences and technology*

Marcolongo, Roberto. Nel trecentenario del dialogo di GALILEO sui due massimi sistemi del mondo. *Atti R. Accad. Naz. Lincei*, Rend. dell' adunanza sol. del 5 giugno 1932, 4, 214-19, 1932. ISIS

Peters, Theodor. CHRISTIAN OTTER, Befestigungslehre. (Rationale Streckenteilung). *Quellen und Studien zur Geschichte der Mathematik*, Abtg. B : 2, H. 4, 352-63, 3 fig., 1933. ISIS

" CHRISTIAN OTTER ist 1598 in Ragnit geboren und nach einem ereignisreichen Leben 1660 ' als erster Professor der Mathematik ' in Nimwegen gestorben. Er war 1648-1657 Hofmathematiker des Grossen Kurfürsten. Weiter berichtet Buck, dass er 1643 dem König CHRISTIAN IV. von Dänemark ' ein von ihm neu erfundenes musikalisches Instrument, welches er Tubam harcotectonicam nannte,' überreicht hat und dafür als Gegengeschenk 200 Taler erhielt. 1638 wurde OTTER in Holland mit CARTESIUS bekannt, ' und mit einer vorzüglichen, und diesem grossen Gelehrten ungewöhnlichen Achtung aufgenommen.' Es ist bekannt, dass CHRISTIAN OTTER sich in zwei Richtungen betätigt hat. Einmal fesselt ihn, wie viele Mathematiker jener Zeit, der Problemkreis der Fortifikation. Zweitens beschäftigt er sich mit der mechanischen Erzeugung von Kurven, verbunden mit Fragen der Winkelteilung, ein Gebiet, das ebenfalls damals aktuell war."

Silverijser, Fl. Les autographes inédits de WENDELIN (1580-1667) à la bibliothèque de Bruges. *Annales de la société scientifique de Bruxelles*, 52, série A (sciences mathématiques), 99-268, 1932. ISIS

Silverijser, Fl. GODEFRIDUS WENDELINUS et les " causes secondes." *Ciel et Terre*, 49, 54-62, 83-88, 111-16, 1933. ISIS

D. — *Medical sciences*

Gibson, Thomas. A sketch of the career of THEODORE TURQUET DE

MAYERNE, physician to four kings, spagyric therapeutist, and pioneer in the compilation of elaborate records of clinical cases. *Annals of Medical History*, 5, 315-26, port., frontispiece, 1933. ISIS

Strubell-Harkort, A. ALBRECHT VON WALDSTEIN, Herzog von Friedland, von Mecklenburg und von Sagan. *Sudhoffs Archiv für Geschichte der Medizin*, 26, 105-20, 4 fig., 1933. ISIS

E. — *Alia*

Boas, George. The happy beast in French thought of the seventeenth century. VIII+160 p. Baltimore, The John Hopkins Press, 1933. ISIS

The subject matter of this essay " could be called ' theriophily.' Theriophily is a form of infra-primitivism which has never been thoroughly explored, though almost as widespread as primitivism itself. I have been interested here in relating its fortunes in France from the time of MONTAIGNE until the beginning of the eighteenth century. My reasons for what may seen like an arbitrary delimitation will be probably apparent from the essay itself. It is to be hoped that some other historian will continue the work here initiated, extending his research into the thought not only of other times but of other places. " Contents : I. Theriophily in MONTAIGNE; 2. The Paradoxes; 3. What led up to MONTAIGNE's theriophily; 4. Theriophily in the early zoölogists; 5. Theriophily in the disciples of MONTAIGNE; 6. Attacks on CHARRON and MONTAIGNE; 7. The philosophic theriophiles of the seventeenth century; 8. Theriophily in the satirists and poets of the seventeenth century; Index.

Jones, Richard F. Science and language in England of the mid-seventeenth century. *J. Eng. and German Philol.*, 31, 315-31, 1932. ISIS

XVIIth Century (second half)

A. — *Mathematics*

Ginsburg, J. Early European notice of scientific work in America. *Scripta mathematica*, 1, 275, 1933. ISIS

Apropos of SAMUEL DANFORTH.

Locke, L. Leland. The contributions of LEIBNIZ to the art of mechanical calculation. *Scripta mathematica*, 1, 315-21, 1 fig., 1 pl., 1933. ISIS

Newton, I. Principii di filosofia naturale. Teoria della gravitazione con note critiche sullo sviluppo dei concetti della meccanica per cura di F. ENRIQUES e U. FORTI. 215 p. (*Per la storia e la filosofia delle matematiche*, N. 3). Roma, STOCK, 1925. ISIS

Turnbull, H. W. JAMES GREGORY (1638-75) : A study in the early history of interpolation. *Proc. Edinburgh Math. Soc.*, 3, 151-72, 1933. ISIS

Villamil, R. de. NEWTON : the man. Foreword by ALBERT EINSTEIN. VI+111 p. London, KNOX, 1931. ISIS

Reviewed by J. PELSENEER, *Isis*, 19, 203-04, 1933.

B. — *Physical sciences and technology*

Carré, J. R. La philosophie de FONTENELLE ou le sourire de la raison. 735 p. *(Bibliothèque de philosophie contemporaine)*. Paris, ALCAN, 1932. ISIS

Reviewed by HÉLÈNE METZGER, *Isis*, 19, 205-07, 1933.

Dijksterhuis, E. J. De ontdekking van het tautochronisme der cycloidale valbeweging. Een bijdrage tot de 300e herdenking van den geboortedag van CHRISTIAAN HUYGENS op 14 April 1929. 35 p., 13 fig., facs. *Euclides*, afl. 5. Jaargang 1928/29. ISIS

The tautochronism of the cycloid with regard to gravity was established by HUYGENS in his *Horologium oscillatorium* (Paris 1673), part II, De descensu gravium et motu eorum in cycloide (prop. XXV). However, following the Greek fashion of that time HUYGENS' account is highly synthetic, and the origins of his thoughts are hidden rather than revealed. The author has found some MSS. dating from 1659 (hitherto unpublished) which help one to reconstruct the development of HUYGENS' ideas on the subject.

G. S.

Evelyn, John. Fumifugium : or the inconvenience of the aer and smoake of London dissipated. First published in 1661 and reprinted with an introduction by ROSE MACAULAY. 42 p. *National Smoke Abatement Society*, 1933. ISIS

Fulton, J. F. A bibliography of the Honourable ROBERT BOYLE, Fellow of the Royal Society. *Oxford Bibliographical Society Proceedings and Papers*, 3, 1-172, Oxford, University Press, 1932. ISIS

Reviewed by T. L. DAVIS, *Isis*, 19, 204, 1933.

(Halley, Edmond). Correspondence and papers of EDMOND HALLEY. Preceded by an unpublished memoir of his life by one of his contemporaries, and the ' Eloge ' by D'ORTOUS DE MAIRAN. Arranged and edited by EUGENE FAIRFIELD MACPIKE. XIV+300 p., 5 port., ills. Oxford, Clarendon Press, 1932. ISIS

Reviewed by W. ALFRED PARR, *Journal of the British Astronomical Association*, 43, 345-57, 1932-33.

Patterson, T. S. JOHN MAYOW—in contemporary setting. I. A contribution to the history of respiration and combustion. II. MAYOW's views on combustion. *Isis*, 15, 46-96, 2 pl.; 504-46, 1931. ISIS

C. — *Natural sciences*

Nekrassow, A. D. Bemerkungen über die Menschlein, die von den Animalkulisten unter dem Mikroskop im menschlichen Samen gesehen wurden, und über die Entstehung der Idee der " Einschachtelung " aller folgenden Generationen in den Geschlechtselementen (den Eiern und Spermatozoen). *Sudhoffs Archiv für Geschichte der Medizin*, 26, 89-104, 1933. ISIS

Neviani, Antonio. Un errore di L. F. MARSIGLI su l' "aqua ardens" di BASNO. *Rivista di storia delle scienze*, 24, 2-7, 1933. ISIS

Apropos of the *Danubius Pannonico-Misicus* (Amsterdam 1726) of LUIGI FERDINANDO MARSIGLI (1658-1730). G. S.

Neviani, Antonio. Una lettera di L. F. MARSIGLI a M. MALPIGHI. *Archeion*, 14, 481-89, 3 fig., 1932. ISIS

" Il m.s. è diviso in due parti : nella prima si tratta delle rocce ramifere, delle quali si fa parola in più opere stampate e mss. del M.; la seconda riguarda le acque del Ciment e Forb, specialmente della prima. Nella esposizione delle ricerche fatte dal Nostro, si nota, come in tanti altri luoghi, la mancanza di una profonda preparazione scientifica; ma vi si scorge l'uomo d'ingegno che scruta appassionatamente il perchè dei fenomeni, ma non riesce sempre andare sino in fondo; il FANTUZZI osserva appunto che il M. si rivolgeva al MALPIGHI per ' lumi e pareri, chiamandolo più maestro che amico'."

Rijnberk, G. van. De taal van LEEUWENHOECK. *Bijdragen tot de geschiedenis der geneeskunde*, 13, 133-35, 1933. ISIS

Volterra, Nella. Sulla malattia e sulla morte di FRANCESCO REDI. *Archeion*, 15, 73-77, 1933. ISIS

D. — *Medical sciences*

Fraser-Harris, D. F. Sir JOHN COLBATCH. A forgotten antiseptic surgeon. *Medical Life*, 40, 289-93, 1933. ISIS

Goulard, R. Déclaration du Roy portant défenses à ceux de la Religion prétendue réformée de faire les fonctions de Sages-femmes (1680). *Bulletin de la société française d'histoire de la médecine*, 27, 59-60, 1933. ISIS

Milch, Werner. DANIEL CZEPKOS Bericht über Krankheit und Tod seiner Frau. 1656. *Sudhoffs Archiv für Geschichte der Medizin*, 26, 146-65, 1933. ISIS

E. — *Alia*

Debès, M. Quelques remarques sur l'opuscule de FONTENELLE intitulé : de l'origine des fables. *Revue de l'histoire des religions*, 107, 56-73, 1933. ISIS

Schaub, Edward L. SPINOZA, the man and his thought. Addresses delivered at the SPINOZA tercentenary sponsored by the Philosophy Club of Chicago. Edited by EDWARD L. SCHAUB. VI+61 p., frontispiece. Chicago, Open Court, 1933 (75 c.). ISIS

" The most significant of the SPINOZA commemorations within the city of Chicago was doubtless the one which was sponsored by The Philosophy Club of Chicago and held in the chapel of The University of Chicago on the evening of December 9. This meeting was opened by the President of the club, Professor CHARLES W. MORRIS of the University of Chicago. Following a brief address he presented, as the chairman of the meeting, President HARRY W. CHASE. After a brief statement of the significance of SPINOZA for the culture of our own day, President CHASE introduced, in turn, Dr. EDWARD L. SCHAUB, Professor of Philosophy in Northwestern University and editor of *The Monist*, who had been assigned the theme, ' SPINOZA : his personality and his doctrine of perfection '; Dr. T. V. SMITH, Professor of Philosophy in the University of Chicago and editor of *The International Journal of Ethics*, who discussed ' SPINOZA's political and moral philosophy '; and Rabbi SOLOMON B. FREEHOF, of K. A. M. Temple, Chicago, who spoke on ' SPINOZA and religion.' "

Wilmer, W. H. The blindness of MILTON. *Bulletin of the Institute of the History of Medicine*, 1, 85-106, 15 fig., Baltimore, 1933. ISIS

XVIIIth Century (whole and first half)

A. — *Mathematics*

Simons, L. G. ISAAC GREENWOOD's *Arithmetic*. *Scripta mathematica*, 1, 262-64, 1933. ISIS

Woyciechowsky, J. v. PAUL SIPOS, ein ungarischer Mathematiker des 18. Jahrh. *Mitt. Math. Semin. Univ.*, 124 p. Debrecen 1932. ISIS

B. — *Physical science and technology*

Borichevski, Ivan. NEWTON and D'ALEMBERT. The struggle for the

foundations of physics in the XVIIIth century. *Archives of the hist. of science and technol.*, 1, 71-90, 1933 (in Russian). ISIS

Clairaut, A. C. Teoria della forma della terra dedotta dai principi dell'idrostatica. Traduzione e note di M. LOMBARDINI. Seguite da una nota di F. ENRIQUES : Il problema della forma della terra nell'antica Grecia. VI+245 p., 57 fig. (*Per la storia e la filosofia delle matematiche*. N. 6). Bologna, ZANICHELLI, 1928. ISIS

Nierenstein, M. A Bristol alchemist. *Transactions of the Bristol and Gloucestershire Archaeological Society*, 54, 265-66, 1932. ISIS

" In a letter addressed to HENKEL, dated from Prague, 17 October 1739, DE BOURNET writes to say that at Amsterdam in 1712 the alchemist PETER OF LEYDEN transmuted in his presence 177 pounds of mercury into pure gold, which DE BOURNET sold to a merchant called GRILL through the agency of the bank at Amsterdam. He goes on to say that the alchemist in question was an Englishman, a native of Bristol, and that his true name was ABRAHAM KINGTON." Who was this PETER OF LEYDEN, alias ABRAHAM KINGTON or KIENTON ? The author gives an account of his investigations which have not yet yielded positive results. G. S.

Origène, A. D. Equerre en cuivre fabriquée par BUTTERFIELD, mécanicien d'origine allemande, qui mourut à Paris en 1725. *Bul. et mém. de la Soc. d'archéol. et d'histoire*, 29-36, Angoulème, 1929. ISIS

Taranovich, V. P. The expeditions of the Academy of Sciences in the XVIIIth century, and their rôle in the advancement of forestry. *Archives of the hist. of sc. and technol.*, 1, 177-204, 4 maps, 1933 (In Russian). ISIS

C. — *Natural sciences*

Steiger, Rud. Verzeichnis des wissenschaftlichen Nachlasses von JOHANN JAKOB SCHEUCHZER (1672-1733). *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, 78, 75 p., 2 pl., 1933. ISIS

The Central Library of Zurich owns the complete ms. apparatus of one of her most illustrious sons, J. J. SCHEUCHZER (1672-1733). The latter has often been misjudged and ridiculed because of his unfortunate identification of the skeleton of a salamander with that of a diluvial man ! *Homo diluvii testis*, Tiguri 1726. In reality he was one of the most distinguished naturalists of the first half of the eighteenth century. Says the preface : " Am 23. Juni 1933 jährt sich der 200. Todestag des Mannes, den man nicht zu Unrecht als den ' Begründer der wissenschaftlichen, alle Verhältnisse berücksichtigenden schweizerischen Landeskunde ' bezeichnet hat. Ist SCHEUCHZER doch der erste gewesen, der unsere Alpen mit den Augen des

Naturkundigen systematisch durchforschte, ihren geologischen Aufbau und die mannigfachen, an ihrer Gestaltung beteiligten Faktoren sich zurechtzulegen versuchte, mit Hilfe der von ihm methodisch geförderten barometrischen Höhenmessung die ersten annähernd richtigen Begriffe von der Höhe unserer Berge vermittelte, der erste auch, der mit Nachdruck auf die paläontologischen Relikte des Landes hinwies, wie er denn als einer der Begründer der Versteinerungskunde überhaupt zu gelten hat. Nicht vergessen sei ferner, dass er, die Wichtigkeit regelmässiger meteorologischer Beobachtungen erkennend, die frühesten brauchbaren Beiträge zu einer schweizerischen Witterungskunde lieferte. Auf diese und andere naturwissenschaftliche Leistungen SCHEUCHZERS ist von berufener Seite hingewiesen worden. Weit weniger bekannt, obschon durchaus bemerkenswert, ist SCHEUCHZERS Tätigkeit auf dem Gebiet der Geschichte und verwandter Wissenschaften; er hat u.a. die erste fast nur auf primären Quellen beruhende Schweizergeschichte verfasst und ist unseres Wissens der einzige,der sich an einer schweizerischen Paläographie und Diplomatik versuchte. Auch sein Wirken als Arzt, Lehrer und Politiker ist fast unbemerkt geblieben."

The present booklet is an excellent instrument for the study of SCHEUCHZER's life and work. It includes a long list of his printed publications, then of the immense collection of MSS. and letters kept in the Zurich Library. This is completed by an alphabetical list of his correspondents, which helps us to realize that a full size biography of SCHEUCHZER would be of considerable interest,—and not only for Swiss readers: it would be an important contribution to the development of science in the first half of the eighteenth century. G. S.

Tucci, Giuseppe. The travels of IPPOLITO DESIDERI. *Journal of the Royal Asiatic Society*, 353-58, 1933. ISIS

Vallisnieri, Antonio (1661-1730). Observations on the fly of rose-bushes and other insects of the same habitat, by ANTONIO VALLISNIERI. Translated by MAB BIGELOW and revised by R. P. BIGELOW. *Isis*, 17, 290-324, 4 pl., 1932. ISIS

Discovery of the garden-rose sawfly, whose anatomical structure and life-cycle are here elaborately described. The original Italian text was first published in Padua, 1713. G. S.

D. — *Medical sciences*

Goulard, R. Déclaration du Roy qui explique ce qui sera observé par les Juges, lorsqu'il se trouvera des Cadavres dans les Rues de Paris, dans la Rivière et autres endroits, pour avoir connoissance de la cause de leur mort. *Bulletin de la société française d'histoire de la médecine*, 27, 57-58, 1933. ISIS

Packard, Francis R. The practice of medicine in Philadelphia in the eighteenth century. *Annals of Medical History*, 5, 135-50, 1933. ISIS

Torlais, Jean. Le Dr. Pierre Baux (de Nîmes) correspondant de Réaumur. *Bulletin de la société française d'histoire de la médecine*, 27, 157-60, 1933. ISIS

XVIIIth Century (second half)

A. — *Mathematics*

Cazalas, E. Goethe et les carrés magiques. *Sphinx*, 2, 65-66, 1932. ISIS

Dijksterhuis, E. J. De grondbeginsels der meetkunde van J. H. van Swinden. Bijdrage tot het jubileum van de Universiteit van Amsterdam. *Euclides*, 8, 265-96, portr., 1931/32. ISIS

Study of Jean Henri van Swinden (1746-1823), professor in Franeker then in Amsterdam, whose (Dutch) *Elements of geometry* has exerted a deep influence on Dutch mathematics. First published in Amsterdam 1790, then again in 1816; translated into German with additions by C. F. A. Jacobi (Jena 1834). G. S.

Stieda, Wilhelm. Johann Bernoulli in seinen Beziehungen zum preussischen Herrscherhause und zur Akademie der Wissenschaften. *Abhandlungen der preussischen Akademie der Wissenschaften*, phil.-hist. Kl., 64 p., 1926. ISIS

B. — *Physical sciences and technology*

Chance, Burton. Goethe and his theory of colors. *Annals of Medical History*, 5, 360-75, 1933. ISIS

Craven, R. M.; Hartog, P. J. Date and place of Priestley's discovery of oxygen. *Nature*, 132, 25-26, 1933. ISIS

Davis, Tenney L. Another Priestley document. *Jour. Chem. Education*, 10, 159, 1933. ISIS

A silver medal commemorating Priestley's departure from England and arrival in America—" APR : VIII BRITTANIAE LITORA LINQUENS COLUMBIAM ADVENIT JUNII : IV MDCCXCIV." T. L. D.

Davis, Tenney L. Further evidence of Priestley's sympathy for the American Revolution. *Jour. Chem. Education*, 10, 348-49, 1933. ISIS

Priestley was elected a foreign honorary member of the American Academy of Arts and Sciences on January 30, 1782. He accepted membership by a letter dated June 23, 1785 in which he wrote (in part), " I rejoice that, after so noble and successful a struggle for your *liberties*, you are now, in time

of peace, attending to matters of *science*. I hope you will have the same success in your exertions in this way." T. L. D.

Hartog, Sir Philip; Meldrum, A. N.; Hartley, Sir Harold. The bicentenrary of JOSEPH PRIESTLEY. *Journal of the Chemical Society*, 896-920, 1933. ISIS

Kamenski, V. A. Production schemes of the Nishne-Tagilsk works in the 80s of the XVIIIth century. *Archives of the hist. of sc. and technol.*, 1, 159-75, 1 fig., 1 pl., 1933. (In Russian). ISIS

Klinckowstroem, Carl Graf von. RAIMONDO DI SANGRO. *Archeion*, 14, 490-91, 1932. ISIS

Lippmann, Edmund O. von. FRIEDRICH DER GROSSE und die Alchemie. *Chemiker-Zeitung*, 57, 293, 1933. ISIS

Lubbock, Constance A. The HERSCHEL chronicle. The life-story of WILLIAM HERSCHEL and his sister CAROLINE HERSCHEL. Edited by his granddaughter CONSTANCE A. LUBBOCK. x+388 p., 9 illus. Cambridge, University Press, 1933 (21s.). ISIS

"The aim of the present work is to present the life-story of WILLIAM and CAROLINE HERSCHEL in the setting of their family circle and of contemporary history, giving it as far as possible in their own words, by extracts from WILLIAM HERSCHEL's brief autobiographical notes and from CAROLINE's very full *Journals*, as well as from letters. It may be thought that too many details concerning WILLIAM HERSCHEL's brothers have been included, but the bonds of family affection were so strong in the HERSCHEL family that no true picture of the two principal characters can be formed if the other members are excluded. WILLIAM HERSCHEL's discoveries and theories have also been presented in his own words, quoted either from the Papers which he communicated to the Royal Society or from his letters. Letters also are given from contemporary men of science to show how these discoveries and theories were regarded in his own time."

Meldrum, Arthur Norman. († 1934) LAVOISIER's early work in science, 1763-1771. *Isis*, 19, 330-63, 1 fig., 1933. ISIS

Contents: Introduction. Part I (1) LAVOISIER's training in science. (2) Meteorology; Appendix: LAVOISIER on meteorology. (3) Lighting; Appendix: LAVOISIER on lighting. (4) GUETTARD—mineralogy and geology; Appendix: LAVOISIER on mineralogical and geological subjects. Part II (1) The water-supply of Paris; Appendix: LAVOISIER on the water-supply of Paris. (2) DÉPARCIEUX—effects of his second memoir. (3) Hydrometry. (4) Hydrometry as a method in water-analysis; Appendix: LAVOISIER on hydrometry. (5) The apparent weight of water: the density of water.

Meldrum, A. N. PRIESTLEY as a practical chemist. *Nature*, 131, 801, 1933. ISIS

Patterson, T. S. PRIESTLEY as a practical chemist. *Nature*, 131, 690, 1933. ISIS

(Priestley). PRIESTLEY celebration at the Chemical Society. *Nature*, 131, 555, 1933. ISIS

(Trevithick, Richard). TREVITHICK Centenary commemoration, 1933. A eulogy delivered by LOUGHNAN ST. L. PENDRED at Dartford Parish Church on April 23rd, 1933. *Nature*, 131, 609-10, 1933. ISIS

Walker, W. Cameron. The " Leeds portrait " of JOSEPH PRIESTLEY. *Nature*, 131, 876, 1 fig., 1933. ISIS

Zeitlin, E. GLINKOV's spinning machine. *Archives of the hist. of sc. and technol.*, 1, 113-32, 2 pl., 1933 (In Russian). ISIS

RODION GLINKOV, 1771.

C. — *Natural sciences*

Cuvier, Georges. Centenaire de GEORGES CUVIER. *Arch. du Museum d'histoire naturelle*, 9, 1-134, 1932. ISIS

Le numéro consacré par les Archives du Muséum d'histoire naturelle au centenaire de GEORGES CUVIER comprend les études suivantes : L. BULTINGAIRE : *Iconographie de G. Cuvier* (1-11, 24 portraits); LOUIS ROULE : *La vie, la carrière et la mort de G. Cuvier* (13-20); R. ANTHONY : *Cuvier et la chaire d'anatomie comparée du Museum d'histoire naturelle* (21-31); MARCELLIN BOULE : *Georges Cuvier fondateur de la paléontologie* (33-46, 2 pl.); LOUIS ROULE : *Cuvier ichthyologiste* (47-51); M. L. JOUBIN : *Études de Cuvier sur les mollusques* (55-61); CHARLES GRAVIER : *Les vers et les arthropodes dans le " Règne animal "* (63-67); A. LACROIX : *Georges Cuvier et la minéralogie* (69-75); L. ROULE : *Cuvier historien scientifique* (77-82); M. FRIANT : *La théorie de la tuberculie et l'influence de la taille sur la forme des dents* (83-92, 1 pl.); W. BESNARD et G. PETIT : *Les relations de la musculature et des papilles de la langue chez les reptiles et les mammifères* (95-132). L. G.

Pérouse, La. Voyage de LA PÉROUSE autour du monde, 1785-1788. Préface et notes de P. DESLANDRES. Paris, ROGER, 1933. ISIS

Rouch, J. La météorologie dans J. J. ROUSSEAU. *Revue générale des sciences*, 44, 270-75, 1933. ISIS

Shear, C. L. The manuscript of JAMES BOLTON's *Icones fungorum circa Halifax sponte nascentium*. *Transactions of the British Mycological Society*, 17, 302-07, facs., 1933. ISIS

Description of that ms. recently acquired in Zurich by the U.S. Department of Agriculture, and comparison with the published work (4 vols., 182 pl., Halifax, 1788-91). G. S.

D. — *Medical sciences*

Abraham, J. Johnston. JOHN COAKLEY LETTSOM. (Query no. 21). *Isis*, 19, 503, 1933. ISIS

Beeson, B. Barker. PIERRE JOSEPH DESAULT. *Annals of Medical History*, 5, 342-48, portr., 1933. ISIS

Bertone, Carlo. Nel bicentenario della nascita di MARCO ANTONIO JEMINA DA MONDOVÌ (1732-1794). Dei suoi studi sul carbonchio e dei medici cosidetti "autosperimentatori." *Rivista di storia delle scienze mediche*, 24, 113-20, 1933. ISIS

Caizergues, J. F. Sur les cours gratuits d'accouchements dans la province de Languedoc de 1781 à 1789. *Bulletin de la société française d'histoire de la médecine*, 27, 133-46, 1933. ISIS

Jackson, Russell Leigh. Dr. HALL JACKSON (1739-1797) of Portsmouth. *Annals of Medical History*, 5, 103-28 ,1 fig., frontisp., 1933. ISIS

Knox, J. H. Mason, Jr. The medical history of GEORGE WASHINGTON, his physicians, friends and advisers. *Bulletin of the Institute of the History of Medicine*, 1, 174-91, Baltimore, 1933. ISIS

Lenghel, Alexander. Zur Genealogie und über den Geburtsort des ungarischen Arztes und Medizinprofessors SAMUEL RÁCZ. (30. März 1744 bis 24. Februar 1807). *Sudhoffs Archiv für Geschichte der Medizin*, 26, 202-04, 1933. ISIS

Lloyd, James Hendrie. Dr. GUILLOTIN's idea. *Annals of Medical History*, 5, 129-34, 1 fig., 1933. ISIS

Palmer, Harold D. The Philadelphia Almshouse described by DE WARVILLE in 1788. *Medical Life*, 40, 226-33, 1933. ISIS

Petzoldt, Ernst. SEBASTIAN GOLDWIZ's Versuch zu einer Physiologie der Galle aus dem Jahre 1785. 45 p. *Institut für Geschichte der Medizin an der Universität Leipzig*, 1932. ISIS

Rubin, Israel. Beiträge zum Vergleich zwischen Chirurgie und Medizin um die Wende des 18. zum 19. Jahrhundert. 33 p. *(Institut f. Geschichte der Medizin an der Universität Leipzig.)* Leipzig, EDELMANN, 1932. ISIS

Steiner, Walter R. Dr. JAMES THACHER of Plymouth, Massachusetts, an erudite physician of Revolutionary and post-Revolutionary fame. *Bulletin of the Institute of the History of Medicine*, ,1 157-73, portrait, Baltimore, 1933. ISIS

Terson, A. TENON comme ophtalmologiste. *Bulletin de la société française d'histoire de la médecine*, 27, 15-22, facs., 1933. ISIS

Zeiss, Heinz. JOHANN PETER FRANKS Tätigkeit in St. Petersburg. *Klinische Wochenschrift*, 12, 353-56, 1933. ISIS

E. — *Alia*

Condorcet. Esquisse d'un tableau historique des progrès de l'esprit humain. Texte revu et présenté par O. H. PRIOR. XXIV+244 p. Paris, BOIVIN, 1933. ISIS

Réimpression de l'édition ARAGO (1847), mais avec indication des additions ou interpolations de passages qui ne se trouvent pas dans le Ms autographe de la bibliothèque de l'Institut, achevé le 4 octobre 1793, environ six mois avant la mort de CONDORCET dans un cachot de Bourg-la-Reine (28 mars 1794). L. G

Dumas, Georges. A propos du centenaire de la mort de GOETHE. *Bull. de l'Académie de Médecine*, 107, 961-66, 1932. ISIS

(Goethe.) Herausgegeben von der preussischen Staatsbibliothek. *(Gesamtkatalog der preussischen Bibliotheken)*. Berlin, Preussische Druckerei, 1932. ISIS

Lovejoy, Arthur O. MONBODDO and ROUSSEAU. *Modern Philology*, 30, 275-96, 1933. ISIS

Schönebaum, Herbert. PESTALOZZI, die Illuminaten und Wien. *Sitzb. der preuss. Akad.* phil.-hist. Kl., 86-106, 1928. ISIS

Schönebaum, Herbert. PESTALOZZI. Kampf und Klärung 1782 bis 1797. 248 p. Erfurt, STENGER, 1931. ISIS

Reviewed by JAKOBUS WEIDENMANN, *DLZ*, 4, 692-95. 1933.

XIXth Century (whole and first half)

A. — *Mathematics*

Bridges, Robert. GEORGE DARLEY (1795-1846). XIII+30 p. (Collected essays, papers, etc. V.) Oxford, University Press, 1930. ISIS

Reviewed by W. FISCHER, *DLZ*, 2, 1703-04, 1931.

Conway, A. W.; Synge, J. L. WILLIAM ROWAN HAMILTON's contributions to geometrical optics. *Nature*, 123, 349, 1929. ISIS

Laplace, Pierre Simon de. Philosophischer Versuch über die Wahrscheinlichkeit (1814). Herausgegeben von R. v. MISES. VII.+211 p. (OSTWALD's *Klassiker*, N. 233). Leipzig, Akadem. Verlagsges., 1932. ISIS

Reviewed by ALDO MIELI, *Archeion*, 15, 91-100, 1933.

Mariani, Jean. EVARISTE GALOIS et l'évolution en mathématiques. *Revue de synthèse*, 4, 7-14, 1932. ISIS

Patterson, Boyd C. The origins of the geometric principle of inversion. *Isis*, 19, 154-80, 1933. ISIS

Chronological summary : " (1) DANDELIN (April 1, 1822) gave his *Tableau Comparatif* for hyperbola and *focale*. (2) QUETELET (Feb. 3, 1823) compared secondary caustics and conics in the way suggested by DANDELIN. (3) STEINER (Feb. 8, 1824) defined his *Wiedergeburt* in a manuscript note published by BÜTZBERGER in 1913. (4) DANDELIN (June 4, 1825) deduced the relation $rr' = R^2$ between corresponding radii vectores of his so-called lemniscates and conics and thus arrived at a new construction of the former curves. (5) QUETELET (Nov. 5, 1825) defined the *inverse* of a curve. (6) PLÜCKER (October 1831) explained his *neues Übertragungs-Princip* which was published in 1834. (7) MAGNUS (1832) mentioned a special case of a more general transformation without naming it. (8) BELLAVITIS (June 1836) gave a complete exposition of the theory of inverse figures. (9) INGRAM (1842) to MÖBIUS (1853)."

Steward, G. C. On the optical writings of Sir WILLIAM ROWAN HAMILTON. *Mathematical Gazette*, 16, 179-91, 1932. ISIS

Winter, Eduard. Die Entwicklung der Auffassung B. BOLZANOS von der Willensfreiheit. Dargestellt auf Grund des handschriftlichen Nachlasses BOLZANOS. *Philos. Jb. Goerres-Ges.*, 45, 483-99, 1932. ISIS

Winter, Eduard. Die Persönlichkeit und geistige Entwicklung BOLZANOS. *Philos. Jb. Goerres-Ges.*, 45, 325-46, 1932. ISIS

B. — *Physical sciences and technology*

Blaschke, M. Zur Geschichte der Wetterkarte. *Das Weltall*, 28, 24-26, 1928. ISIS

Brand, Kurt. Einfluss von JUSTUS VON LIEBIG auf die Entwicklung der pharmazeutischen Chemie. *Z. angew. Chem.*, 44, 763, 1931. ISIS

Brand, Kurt. Die quellenanalytischen Untersuchungen JUSTUS VON LIEBIG's. Festrede, gehalten bei der Einweihung der Liebig-Gedenktafel in Bad-Salzhausen am 12. Mai, 1928. Giessen, Liebig-museum, 1928. ISIS

Brillouin, Marcel. POISEUILLE (JEAN-LÉONARD-MARIE) né à Paris le 23 avril 1797, mort à Paris le 26 décembre 1869. *Ann. de Phys.*, 15, 411-17, 1931. ISIS

Cayley, Sir George. Aeronautical and miscellaneous notebook (ca. 1799-1826). With an appendix comprising a list of the CAYLEY papers. XX+93 p., 2 pl. (Extra publication no. 3). Published for the Newcomen Society by HEFFER, Cambridge, 1933. ISIS

Dijksterhuis, E. J. Bij het jubileum der electromagnetische inductie, 1831-1931. 41 p. DE GIDS, 1931. ISIS

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Reviewed by JOHN READ, *Nature*, 131, 294-95, 1933.

Schuster, Sir Arthur. Biographical fragments. XIV+268 p., 8 pls. London, MACMILLAN, 1932 ($3.00). ISIS

This is an autobiography, with an account of the eclipse expedition to Siam in 1875 and a paper on the probable unity of chemical substances, presented in 1903 at the British Association for the Advancement of Science, but not published. Brief personal recollections of leading physicists are presented, including LEVERRIER, JOULE, BALFOUR STEWART, KIRCHHOFF, BUNSEN, BOLTZMANN, LANGLEY, REYNOLDS, WEBER, WÖHLER, KLINKERFUES, STOKES, VON HELMHOLTZ, HERTZ, VON RÖNTGEN, and WILDE. C. A. K.

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number, July 1931. 272 p., figs. London, Society of Chem. Industry, 1931. ISIS

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Translation of an abstract of the *Lebensläufe aus Franken*, 4, 16 p., Würzburg, 1930. J. P.

C. — *Natural sciences*

Barclay, Edgar N. The introduction and extermination of roe deer in Ireland. *Natural History Magazine*, 3, 265-67, 1932. ISIS

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Gulick, Addison. Evolutionist and missionary, JOHN THOMAS GULICK :

portrayed through documents and discussions. XVI+556 p., 3 pl. Chicago, University Press, 1932. ISIS

Reviewed in *Nature*, 131, 532 ,1933.

Hoffmann, Bernhard. Aus BERNHARD HANTZSCHS letztem Tagebuch (Balfinland-Reise). *Mitt. Ver. sächs. Ornithologen*, Sonderheft zu Bd. 2 (1927 bis 1929) 5-28, pl., Dresden, 1929. ISIS

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Jaeger, Max. G. JAEGERS Lebens- und Entwicklungsgang. 74 p. (In : *Zum 100. Geburtstag von Prof. Gustav Jaeger*, 23. Juni 1932). Stuttgart, KOHLHAMMER, 1932. ISIS

Keller, Conrad. Lebenserinnerungen einer schweizerischen Naturforschers. VIII+162 p., ill. Zurich, FÜSSLI, 1928. ISIS

Reviewed by ALDO MIELI, *Archeion*, 15, 145-49, 1933.

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D. — *Medical sciences*

Boucher, J. Avant PASTEUR : les théories de VOIZOT. *R. d'hist. de la pharmacie*, 9-27, 1933. ISIS

EDME VOIZOT (1801-1867) ‚dans une note à l'Académie des sciences (1854) et dans une brochure de 80 p. publiée l'année suivante : *Réflexions sur le choléra asiatique*, a montré que la cause première du choléra est un germe spécifique vivant. L. G.

Braun, Gustav. RUDOLF VIRCHOW und der Lehrstuhl für pathologische Anatomie an der Universität Zürich. 69 p. (*Zürcher med. gesch. Abh.* 8). Zürich, FÜSSLI, 1926. ISIS

Burr, Charles W. JAMES HENDRIE LLOYD. *Medical Life*, 40, 285-88, port., 1933. ISIS

Calmette, A. ROBERT KOCH. Le cinquantième anniversaire de la

découverte du bacille tuberculeux. *Bull. de l'Acad. de médecine*, 107, 436-55, 1932. ISIS

Diepgen, Paul. RICHARD WAGNER im Spiegel der zeitgenössischen Medizin, anlässlich der 50. Wiederkehr seines Todestages (13. 11. 1883). *Pharma-Medico*, 1, 5 p., München, 1933. ISIS

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Faure, J. L. LÉON LABBÉ, 1832-1916. Éloge prononcé à l'Académie de médecine à l'occasion de son centenaire. *Progrès médical*, no. 52, 2265-83, 1932. ISIS

Reviewed in *Bulletin de la société française d'histoire de la médecine*, 27, 125-27, 1933.

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(His, Wilhelm). WILHELM HIS der Anatom. Ein Lebensbild. IV+ 79 p., 1 pl. Berlin, URBAN & SCHWARZENBERG, 1931. ISIS

Reviewed by HABERLING, *Mitteilungen z. Gesch. d. Med.*, 31, 179, 1932.

Hume, E. Douglas. BÉCHAMP or PASTEUR? A lost chapter in the history of biology founded upon a Ms. by MONTAGUE R. LEVERSON. With a foreword by S. JUDD LEWIS. 301 p., port. London, DANIEL, 1932 (6s.). ISIS

The first edition of this attack upon PASTEUR appeared in 1923 through the aid of an anonymous patron. The authoress has also written *Hydrophobia and the mad dog scare* (1919), published by the London Antivivisection Society and an article, *Lady Anopheles*, in the *Forum* (1914) in which the agency of the mosquito in the transmission of malaria is attacked.

The animus throughout is to exalt the work of BÉCHAMP at the expense of PASTEUR, and by this method and the inclusion of material not germane to the title, to discredit vaccination, the use of serums, and animal experimentation. This endeavor is shrouded in a studied effort to assume the sanction of a scientific and historical treatment. The scientific data are sometimes utilized with a ludicrous incomprehension of their real relations. The wonder is not that a chapter in the history of science has been lost, but that two editions of its discovery should have been published!

BÉCHAMP was a contemporary of PASTEUR, a professor of pharmacy and medical chemistry at Montpellier and of biochemistry at Lille. He narrowly antedated PASTEUR in some experimental studies on fermentation, introduced the term *zymase*, and proposed the parasitic nature of the diseases of the silk worm prior to PASTEUR. His underlying theory of microzymas (1883) was a comprehensive granular or atomistic hypothesis which confused cell granules, bacteria, and other minute Protista, in an assumed continuity. This was applied with a universality adequate to explain such diverse phenomena

as geological deposits, fermentation, decay, disease, growth, and heredity. His ideas did little, if anything, to clarify biological thinking or to pave the way for modern developments in microbiology. PASTEUR's omissions of direct references to BÉCHAMP's papers may seem at first sight ungenerous, but they should be judged in the light of BÉCHAMP's vague and fantastic general ideas. PASTEUR's ideas ultimately grew into a coherent system which, in the main, has stood the test of time. BÉCHAMP's have justly been forgotten.

The emotional basis, the intellectual feebleness, and the anti-scientific and anti-social character of the whole anti-medical movement is superbly illustrated in the motivation and in the pseudo-scientific and ofttimes painfully unintelligent content of this subsidized book of propaganda.

C. A. K.

Jellinek, Stephan. Die Entdeckung der biologischen Fernwirkung der Elektrizität. Anlässlich D'ARSONVALS 80. Geburtstage am 8. Juni 1931. *Wien. klin. Wschr.*, 44, 1343-44, 1931. ISIS

Klemperer, Georg. 50 Jahre Kongress für Innere Medizin, 1882-1932. Berlin, BERGMANN, 1932. ISIS

Reviewed by DAVID RIESMAN, *Annals of Medical History*, 5, 102, 1933.

(Koch, Robert). The 50th anniversary of KOCH's discovery of the tubercle bacillus. *Isis*, 19, 200, 1933. ISIS

Lockemann, Georg. Die Begründung der wissenschaftlichen Desinfektion durch ROBERT KOCH, zur 50 jähr. Gedenkfeier der Entdeckung des Tuberkelbazillus. *Z. angew. Chem.*, 45, 273-76, 1932. ISIS

Reviewed by DIERGART, *Mitteilungen zu Gesch. d. Med.*, 31, 240, 1932.

Mégroz, Rodolphe Louis. RONALD ROSS: Discoverer and creator. With a preface by OSBERT SITWELL. 282 p., 4 pl. London, ALLEN and UNWIN, 1931. ISIS

Reviewed in *Nature*, 131, 40-41, 1933.

Oettingen, W. F. von. The earliest suggestion of the use of cocaine for local anesthesia (MORÉNO Y MAIZ, 1868). *Annals of Medical History*, 5, 275-80, 1933. ISIS

Pagel, Walter. VIRCHOW und die Grundlagen der Medizin des XIX. Jahrhunderts. 44 p. (*Jenaer med. histor. Beitr.* H. 14). Jena, FISCHER, 1931. ISIS

Reviewed by HABERLING, *Mitteilungen z. Gesch. d. Med., d. Naturw. u. d. Techn.*, 31, 55-56, 1932; by F. M. G. DE FEYFER, *Bijdragen tot de geschiedenis der geneeskunde*, 12, 95, 1932.

Pasteur, Louis. Œuvres rassemblées et classées par ordre chronologique avec des pages inédites et des notes par PASTEUR VALLERY-RADOT. T. VI : Maladies virulentes, virus-vaccins et prophylaxie de la rage. 918 p. Paris, MASSON, 1933. ISIS

Je rappelle l'ordre des vol. précédents : T. I : Dissymétrie moléculaire. T. II : Fermentations et générations dites spontanées. T. III : Études sur le vinaigre et sur le vin. T. IV : Études sur la maladie des vers à soie. T. V : Études sur la bière, avec une théorie nouvelle de la fermentation. Le T. VII et dernier (qui paraîtra en 1934) comprendra : Notes scientifiques diverses; discours; articles; correspondance; table chronologique des publications de PASTEUR et une table analytique générale.

Richet, Charles. Les origines de la sérothérapie ; son passé, son présent, son avenir. *Bull. de l'Acad. de médecine*, 108, 1164-69, 1932. ISIS

L'origine : expériences faites en 1887-88, sur la nature du cancer par C. RICHET et J. HÉRICOURT, communiquées à l'académie de médecine le 5 novembre 1888. La première injection sérothérapique sur l'homme a été faite le 6 décembre 1890 par A. VERNEUIL. L. G.

Rolleston, J. D. Sir BENJAMIN WARD RICHARDSON : his life and work. *Janus*, 36, 361-83, 1932. ISIS

One of the most prominent sanitarians of the Victorian era, RICHARDSON (1828-1896) was a skillful and prolific writer, respected and honored not only in England but abroad. The twelve volumes of *The Asclepiad* (1884-1895) he wrote entirely himself. In this remarkable journal are a series of 44 delightful biographical sketches of eminent physicians and biologists, as well as many excellent experimental and clinical papers, and numerous articles on various aspects of hygiene, in which RICHARDSON was especially interested. He founded (1855) the *Journal of Public Health and Sanitary Review*, and popularized sanitary reforms through societies and extensive lecturing. He ardently opposed the use of alcoholic beverages, but was no bigot. His experimental studies on anesthesia and amyl nitrite are noteworthy, and he introduced iodine and hydrogen peroxide as antiseptics. His autobiography, *Vita Medica* appeared in 1897. ROLLESTON's admirable sketch is concerned chiefly with RICHARDSON's relation to preventive medicine. C. D. L.

Ross, Sir Ronald. Notice by FRANCESCO PELLEGRINI, *Rivista di storia delle scienze*, 24, 22-26, 1933. ISIS

Schwering, Julius. FRIEDRICH WILHELM WEBER, der Arzt und Dichter. Unter Benutzung seines handschriftlichen Nachlasses dargestellt. VIII+136 p., 6 pl. (*Arbeiten z. Kenntnis d. Gesch. d. Mediz. im Rheinld. u. in Westfalen*, hrsg. v. PAUL KRAUSE. H. 10.) Jena, FISCHER, 1932. ISIS

Reviewed by W. PAGEL, *DLZ* 4, 90, 1933.

Senn, Ernst. THEODOR BILHARZ. Ein deutsches Forscherleben in Ägypten, 1825-1862. 76 p., 3 pl. (*Schriften des Deutschen Ausland-Instituts*, Stuttgart, Reihe D: Biographien u. Denkwürdigkeiten, Bd. 5). Stuttgart, Ausland u. Heimat Verlagsgesellschaft, 1931. ISIS

Reviewed by LUDWIG KEIMER, *OLZ* 36, 287, 1933.

Sigerist, Henry E. A collection of nineteenth century autographs. Being a contribution to the history of anesthesia. *Bulletin of the Institute of the History of Medicine*, 1, 107-17, 7 fig., 1933. ISIS

Apropos of the use of laughing gas and the erotic fantasies frequently caused by it. G. S.

Thayer, William Sydney. OSLER and other papers. VI+386 p. Baltimore, Johns Hopkins Press, 1931. ISIS

Reviewed in *Nature*, 131, 40-41, 1933; and in *Annals of Medical History*, 4, 314, 1932.

Virchow, Hans. Die Abstammung RUDOLF VIRCHOWS. *Mitteilungen zur Geschichte der Medizin*, 32, 220-22, 1933. ISIS

(Wernher, Karl Gustav Adolf), Professor der Chirurgie, 1808-1863. Obituary by KARL SUDHOFF. *Sonderabdruck aus den Hessischen Biographien*, 3, 206-09, (no date). ISIS

Wesson, Miley B. GEORGE E. GOODFELLOW, frontier surgeon and soldier (1855-1910). *Annals of Medical History*, 5, 236-45, 4 fig., 1933. ISIS

E. — *Alia*

Beauvais, René de. LOUIS DELAPORTE, explorateur. 206 p., ill., Paris, LAROSE, 1930. ISIS

Bode, Wilhelm von. Mein Leben. 1. Band. 205 p., 16 pl. Berlin, RECKENDORF, 1930. ISIS

Reviewed by K. K. EBERLEIN, *DLZ*, 1, 1153-59, 1930.

(Christie, Dugald). DUGALD CHRISTIE of Manchuria. Pioneer and medical missionary. The story of a life with a purpose, by his wife. With foreword by SAO-KE ALFRED SZE. 232 p. London, CLARKE, 1932? ISIS

Courau, Robert. FERDINAND DE LESSEPS. De l'apothéose de Suez

au scandale de Panama. 293 p., 2 maps. Paris, GRASSET, 1932. ISIS

Reviewed by PHILIPPE TONGAS, *Revue générale des sciences*, 43, 380, 1932.

Davidson, E. F. EDWARD HINCKS (1792-1866). A selection from his correspondence. With a memoir. VIII+273 p., frontispiece. Oxford, University Press, 1933 (20 s.). ISIS

We welcome with special pleasure this biography of a man who did not receive a meet reward from his contemporaries. "Though the genius of Dr. HINCKS and the results which he achieved are doubtless appreciated by Oriental scholars, it is probable that among ten ordinary educated English people who would know the other names mentioned above, scarcely one would be found familiar with that of HINCKS. He spent the greater part of his life, from the time when he was 33 till he died at the age of 74, as Rector of a remote country parish in the north of Ireland. He had no ready access to libraries, or to museums containing the materials for his researches. Still less had he the means or opportunity for travel, so that he never visited the East, or saw in their own lands the buildings and inscriptions of Egypt and Assyria." (p. vii). G. S.

Gwynn, Stephen. The life of MARY KINGSLEY. VIII+272 p., 2 pl. London, MACMILLAN, 1932. ISIS

Reviewed in *Nature*, 130, 609-10, 1932.

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Morgan, George A. WILHELM DILTHEY (1833-1911). *Philosophical Review*, 351-80, July 1933. ISIS

"SPENGLER and many of his contemporaries constitute a revival of imaginative metaphysics. Between German thought of our own day and the Romantic epoch DILTHEY thus stands as a mediator. In him a type of philosophic interest and insight ran as it were underground through an age otherwise absorbed. The 'metaphysical consciousness,' his intuitive *Lebensanschauung*, preserved some of the fundamental intuitions of philosophy through a wintry season unfavorable to their normal unfolding. He marks a low point in speculative thought, a moment when the only victory for poetic and religious interests lay in a kind of Fabian retreat into irrationalism. Torn in many directions by conflicting tendencies within and about him, he illustrates the pathos of historical relativity, which he perceived so keenly, without so much as the satisfaction of having completed something whole and enduring. But he does not seem to have complained and the spirit of earthly life which he felt but could not express was shared with the men who knew him."

Ravaisson, Félix (1813-1900). Testament philosophique et fragments. Précédés de la notice lue en 1904 à l'Académie des sciences morales et politiques par HENRI BERGSON. Texte revu et présenté par CHARLES DEVIVAISE. (*Bibl. de philosophie*). VIII+200 p. Paris, BOIVIN, 1933. ISIS

Le *Testament philosophique* de RAVAISSON a été publié en 1901 dans la *Revue de métaphysique et de morale* par les soins de XAVIER LÉON d'après les notes laissées par RAVAISSON. C. DEVIVAISE ajoute au texte publié par X. LÉON des passages empruntés aux ébauches du *Testament*, et par lesquels l'œuvre lui a semblé " se compléter et s'éclairer, surtout pour des lecteurs qui ne sont plus contemporains de RAVAISSON." Cette nouvelle édition est suivie de quatre fragments, dont deux n'ont pas de titres et dont les deux autres sont intitulés : Ébauche d'une philosophie (7 p.), et Fragment d'une étude sur les mystères (22 p.). La très importante notice de BERGSON qui sert d'introduction à l'ensemble occupe 64 p. du volume. L. G.

Sayce, Archibald Henry. Obituaries by F. LL. GRIFFITH and S. LANGDON, *Journal of the Royal Asiatic Society*, 497-503, 1933. ISIS

Sée, Henri. La philosophie de l'histoire dans ERNEST RENAN. *Rev. historique*, 170, 46-61, 1932. ISIS

XXth Century

A. — *Mathematics*

(Chace, Arnold Buffum). ARNOLD BUFFUM CHACE. Obituary by R. C. ARCHIBALD. *American Mathematical Monthly*, 40, 139-42, port., 1933. ISIS

Hilbert, David. Gesammelte Abhandlungen. I. Zahlentheorie. XIV+539 p. Berlin, SPRINGER, 1932. ISIS

Reviewed by L. J. MORDELL, *Mathematical Gazette*, 16, 279-80, 1932.

Kruppa, E. EMIL MÜLLER (1861-1927). *Jhrsber. Dtsch. Math.-Ver.*, 41, 50-58, 1931. ISIS

Kryloff, Nicolas. LUIGI BIANCHI (1856-1928). *Bull. Acad. Sciences.* URSS. 855-58, 1929 (Russ.). ISIS

Lehmer, Derrick N. Hunting big game in the theory of numbers. *Scripta mathematica*, 1, 229-35, 1933. ISIS

" On the 19th of October a little group of mathematicians gathered in the Burt Laboratories in Pasadena, California, around a mysterious machine to watch it attack a problem in mathematics. It was a simple enough

problem to state. It had only to find two numbers which when multiplied together would give 5,283,065,753,709,209. Any person with a few hundred years of leisure time on his hands could work it out..."

(Plate, Ludwig). Festschrift zum 70. Geburtstage von LUDWIG PLATE. Hrsg. v. R. HESSE, A. HASE, B. KLATT, V. FRANZ, E. UHLMANN, H. HOFFMANN. *Jenaische Zsft. f. Naturw. d. Med.-naturw. Gesellsch. zu Jena*, 67, 588, p. ill., 1 port., 1932. ISIS

Rosenthal, A. VICTOR EBERHARD (1861-1927). *Jhrsber. Dtsch. Math.-Ver.*, 41, 40-49, 1931. ISIS

Schur, Friedrich. Nachruf auf OTTO STAUDE (1857-1928). *Jber. Deutsch. Math.-Ver.*, 40, 219-23, 1931. ISIS

B. — *Physical sciences and technology*

Aston, F. W. The story of isotopes. *Science*, 78, 5-6, 1933. ISIS

Blodgett, Katherine B. IRVING LANGMUIR. *Jour. Chem. Education*, 10, 396-99, 1933. ISIS

Dines, William Henry. Collected scientific papers of WILLIAM HENRY DINES, B. A., F. R. S. x+461 p. London, *Royal Meteorological Society*, 1931. ISIS

Reviewed by G. C. SIMPSON, *Nature*, 129, 811-12, 1932.

Feldhaus, Gilbert W. Die Entwicklung des Menschenfluges. *Das Weltall*, 28, 5-10, 2 fig., 1928. ISIS

(Ferrié, Gustave). Funérailles de GUSTAVE FERRIÉ, membre de la section de géographie et navigation de l'Académie des Sciences à Paris, le jeudi 18 février 1932. Discours de ROBERT BOURGEOIS. *Annuaire du Bureau des Longitudes pour l'an* 1933, notice D, 7 p., Paris, 1933. ISIS

Gans, Richard. Die Physik der letzten dreissig Jahre. 19 p. (*Königsberger Universitätsreden*, H. 7). Königsberg, GRÄFE und UNZER, 1930. ISIS

Gerlach, W.; Sommerfeld, A. HERMANN ANSCHÜTZ-KAEMPFE (1872-1931). *Die Naturwissenschaften*, 19, 666-69, 1931. ISIS

Hale, William J. A decade of advance in organic chemical manufacture. *Jour. Chem. Education*, 10, 464-68, 1933. ISIS

Kiebitz, F. NIKOLA TESLA zum fünfundsiebzigsten Geburtstage. *Die Naturwissenschaften*, 19, 665-66, 1931. ISIS

Kronman, E. S. Rhenium (Opyt monografii elementa no. 75). 85 p. Moscow, N.K.T.P. The Gold and Platinum Institute, 1932. ISIS

Reviewed by J. G. F. DRUCE, *Nature*, 131, 224, 1933. History of element no. 75, discovered in 1925.

Matschoss, Conrad. ROBERT BOSCH und sein Werk. VIII+126 p., ill. Berlin, VDI-Verlag, 1931. ISIS

Reviewed by ALDO MIELI, *Archeion*, 15, 144-49, 1933.

Neufeld, Martin W. (1881-1932). Obituary by PAUL DIERGART, *Archeion*, 14, 535-36, 1932. ISIS

Piccard, Auguste. A 16,000 metri. I miei viaggi nella stratosfera. Prefazione di ITALO BALBO. Milan, MONDADORI, 1933. ISIS

(Vowles, Mrs. Margaret Winifred, 1883-1932). Historian of technology. Obituary by GEORGE SARTON. *Isis*, 19, 199, 1933. ISIS

C. — *Natural sciences*

Aagaard, B. Fangst og forskning i Sydishavet. 2 vols. 1068 p. Oslo, GYLDENDAL, 1930. ISIS

Reviewed by R. N. R. BROWN, *Geographical Journal*, 77, 386-87, 1931. "The story of Norwegian endeavour in the Antarctic as far as it was connected with Norwegian whalers and whaling." C. W. A.

Ball, John. Obituary notice of Prince KEMAL-EL-DIN HUSSEIN. *Geographical Journal*, 80, 367-68, 1932. ISIS

(HUSSEIN, 1875-1932). Expeditions in caterpillar cars 1923-26, by which many blanks in the map of the Libyan Desert and Northern Sudan were filled. C. W. A.

Bernacchi, L. C. A very gallant gentleman. 240 p., 8 pl. London, BUTTERWORTH, 1933. ISIS

Biography of Capt. OATES. Reviewed by J. G. H., *Nature*, 131, 782-83, 1933.

(Brachet, Albert, 1869-1931). By A. CELESTINO DA COSTA. *Arquivo de anatomia e antropologia*, 14, 395-431, port., 1932. ISIS

With portrait and bibliography. In Portuguese with French translation. G. S.

Francé, Raoul H. Der Weg zu mir. Der Lebenserinnerungen erster Teil. 236 p., 11 port. Leipzig, KRÖNER, 1927. ISIS

(Gregory, J. W.) Obituary by C. W. HOBLEY, *Geographical Journal*, 80, 269-70, 1932. ISIS

JOHN WALTER GREGORY (1864-1932), professor of geology at Glasgow, 1904-1929, president of the Geological Society of London, 1928-1930. C. W. A.

Hayes, J. Gordon. The conquest of the South Pole: Antarctic exploration 1906-1931. 318 p., 24 pl. London, BUTTERWORTH, 1932. ISIS

Reviewed by J. M. WORDIE, *Nature*, 130, 945, 1932.

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Reviewed by J. S. GARDINER, *Geographical Journal*, 80, 349-50, 1932. "Results which must become classical in the history of marine biology." C. W. A.

Hirmer, Max. KARL VON GOEBEL, der Forscher und Lehrer. Festrede zur Feier seines 75. Geburtstages am 8. März 1930. 11 p. München, HUEBER, 1930. ISIS

Reviewed by ZAUNICK, *Mitteilungen z. Gesch. d. Med.*, 31, 129, 1932.

Lowie, Robert H. ERLAND NORDENSKIÖLD (1877-1932). *American Anthropologist*, 35, 158-64, 1 pl., 1933. ISIS

Rabaud, Etienne. La biologie. Son développement depuis le début du XX^e^ siècle. *Larousse mensuel*, 9, 55-57, 3 port., 1932. ISIS

Shackleton, Sir Ernest. The heart of the Antarctic: the story of the British Antarctic expedition, 1907-1909. New and revised edition. 384 p. London, HEINEMANN, 1932. ISIS

(Stephenson, John, 1871-1933). Obituary by G. MacI. C. SMITH, *Journal of the Royal Asiatic Society*, 495-97, 1933. ISIS

(Walther, Johannes). Festschrift fur JOHANNES WALTHER. Gemeinsam m. d. Sekretären RUDOLF DISSELHORST u. EMIL ABDERHALDEN hrsg. v. JOHANNES WEIGELT. VIII+668 p., 93 pl., figs. (Leopoldina. *Berichte der Kaiserlich Leopoldinischen Deutschen Akademie der Naturforscher zu Halle*, Bd. 6). Leipzig, QUELLE & MEYER, 1932. ISIS

Reviewed by A. STRIGEL, *DLZ*, 3, 1529-32, 1932.

Warrain, Francis. L'œuvre psycho-biophysique de CHARLES HENRY. 550 p., portrait. Paris, Nouvelle Revue Française, 1932. ISIS

D. — *Medical sciences*

(Fisk, Harlan Wilbur, 1869-1932). Obituary by H. D. HARRADON, *Terrestrial Magnetism and Atmospheric Electricity*, 55-58, port., 1933. ISIS

Lubarsch, Otto. Ein bewegtes Gelehrtenleben. Erinnerungen und Erlebnisse, Kämpfe und Gedanken. VII+606 p., 1 port. Berlin, SPRINGER, 1931. ISIS

Reviewed by H. KERSCHENSTEINER, *DLZ* 3, 426-28, 1932; by M. A. VAN ANDEL, *Bijdragen tot de geschiedenis der geneeskunde*, 13, 100-01, 1933.

E. — *Alia*

Danielsson, O. A. Symbolae philologicae O. A. DANIELSSON octogenario dicatae. X+390 p., 1 port. Upsala, ALMQVIST & WIKSELL, 1932. ISIS

Reviewed by ED. SCHWYZER, *DLZ* 4, 1122-29, 1933.

(Horber, Carl, 1882-1931). Swiss economist. Obituary by G. SARTON and ADOLF GRAF, *Isis*, 19, 197-99, 1933. ISIS

Marett, R. R.; Penniman, T. K. SPENCER's scientific correspondence with Sir J. G. FRAZER and others. XI+174 p. Oxford, Clarendon Press, 1932. ISIS

Oppeln-Bronikowski, Friedrich von. Archäologische Entdeckungen im 20. Jahrhundert. 165 p., 40 illus. Berlin, KELLER, 1931. ISIS

Reviewed by R. A. S. MACALISTER, *Antiquity*, 114, 1932.

(Wellmann, Max). MAX WELLMANN zum 70. Geburtstag. By PAUL DIEPGEN, *Deutsche medizinische Wochenschrift*, Nr. 10, 378, 1933. ISIS

PART II

HISTORICAL CLASSIFICATION

I. — ANTIQUITY

1. — ANTIQUITY *(generalities)*

Baumann, E. D. Ueber die Erkrankungen der Nieren und Harnblase im klassischen Altertum. *Janus*, 37, 65-83, 116-21, 145-52, 1933. ISIS

Cary, M.; Warmington, E. Les explorateurs de l'Antiquité. Traduction française de A. et H. COLLIN DELAVAUD. 349 p., 15 cartes. Paris, PAYOT, 1932 (36 fr.). ISIS

Les mobiles des anciens dans leurs tentatives incessantes pour reculer les limites des territoires connus étaient d'ordre purement matériel; le voyage scientifique est une exception. Il ne faut pas attribuer cette recherche matérielle à un esprit de lucre plus grand chez les anciens que chez les modernes, mais bien plutôt aux dures conditions de vie qui poussaient vers l'aventure les deux principales nations exploratrices de ces temps : les Phéniciens et les Grecs. Poussés par la nécessité, ils se mirent en quête de pays cultivables, de zônes métallifères, de marchés internationaux. Depuis 1500 avant J. C., les anciens recherchent des débouchés pour leurs produits et le commerce extérieur consiste en échanges. 900 ans avant J.-C., l'ambre baltique est importée en Italie et les bronzes venant d'Étrurie trouvent des débouchés jusque sur la Vistule.

D'autre part, de grandes découvertes ont été faites par des bandes de soldats cherchant de nouveaux mondes à conquérir. Rien ne peut se comparer à la pénétration systématique du continent européen par les armées romaines. Avant elles, ALEXANDRE bouleverse l'ordre du monde ancien en en suscitant un nouveau et élargit l'horizon des peuples méditerranéens : l'Asie est ouverte aux occidentaux et la culture grecque introduite en Asie occidentale.

Les découvertes des Anciens furent les préludes des explorations des XIV^e^ et XV^e^ siècles. En 1410, la traduction latine de PTOLÉMÉE fut un évènement d'importance. L'existence d'un continent inconnu situé à l'ouest de l'Europe est supposée par les savants dès le II^e^ siècle avant J.-C.; la grande autorité de PTOLÉMÉE imagine ces régions inexplorées comme se prolongeant à l'infini et c'est cette certitude qui détermine CHRISTOPHE COLOMB à s'embarquer sur l'Atlantique et à faire voile pour l'Inde. Édition anglaise 1929. *Isis*, 18, 376. L. S.

Eginitis, Demetrios. Les marées dans la science ancienne. *Praktika de l'Académie d'Athènes*, 7, 194-203, 1932. ISIS

Reviewed in *Geographical Review*, 23, 337, 1933.

Eginitis, Demetrios. Les marées dans la science antique. *Scientia*, 53, 385-93, 1933. ISIS

Exposé des théories d'ARISTOTE (la marée due à l'action du vent, qui, ainsi que tout mouvement, est occasionné par le soleil), d'ERATOSTHÈNE qui considère déjà " les flux et reflux qui en résultent, comme en relation étroite avec le mouvement diurne de la lune," de POSIDONIUS " qui a observé et connu le plus complètement les phénomènes généraux de la marée," d'ATHÉNODORE, de STRABON, de PLINE. L. G.

Meyer, Eduard. Geschichte des Altertums. 2., völlig neubearb. Aufl. II. B. 2. Abt. : Der Orient vom 12. bis zur Mitte des 8. Jahrh. Aus dem Nachlass hrsg. von HANS ERICH STIER. v+460 p. Stuttgart, COTTA, 1931. ISIS

Reviewed by MAX PIEPER, *OLZ* 36, 201-09, 1933.

Palhoriès, F. L'héritage de la pensée antique. 200 p. *(Bibl. de philosophie contemporaine.)* Paris, ALCAN, 1932. ISIS

2. — EGYPT

Baslez, Louis. Les poisons dans l'antiquité égyptienne. 58 p. Paris, LE FRANÇOIS, 1932 (8 fr.). ISIS

The earliest form of Egyptian therapeutics made extensive use of animal substances and products of both domestic and wild species. Vegetable drugs came into use later empirically and in small doses. The secret cults gained wide knowledge of vegetable poisons by tests upon slaves. The mineral poisons were imperfectly known, mercurials only as cinnabar; arsenic and antimony probably only as occasional contaminations; lead colic was known; copper sulphate and basic carbonate were used. The Memphis stone, reputed to be an analgesic when powdered, may have been mixed with opium.

Nepenthe has been variously explained as ox tongue, hyoscyamus, or iris root, but was probably opium. In addition to these medicinal plants others were well known, including datura, coriander, carob-tree, hemlock, Indian hemp, and peach stones, from which prussic acid was prepared. Snake poisons were well known and widely utilized, as was also that of the toad and seahare *(Aplysia)*. Soot entered into many medicaments. Excrements and putrefying substances were utilized, probably as a source of ptomaines or infections. C. A. K.

Budge, Sir E. A. Wallis. The bandlet of righteousness. An Ethiopian book of the dead. The Ethiopic text of the *Lefāfa Sedeq*: in facsimile from two manuscripts in the British Museum. Edited with an English translation. xv+140 p., 67 pl. (LUZAC's *Semitic text and translation series*, vol. 19). London, LUZAC, 1929. ISIS

Reviewed by SOLOMON L. SKOSS, *Jewish Quarterly Review*, 23, 402-04, 1933. " While this book ' contains in a much-abbreviated and succint

form all the essential elements of the *Book of the Dead* as found in the Recension which was in use in Egypt during the Graeco-Roman period ' (p. 2), it is the Virgin MARY to whom we really owe its revelation."

Caton-Thompson, G.; Gardner, E. W. The prehistoric geography of Kharga Oasis. *Geographical Journal*, 80, 369-409, pl., maps, 1932. ISIS

Fertility from springs from Acheulean to Capsian times, followed by desert conditions until an artesian supply was opened by Persians in the XXVIIth dynasty. C. W. A.

Flight, John William. Some observations on the problem of Semitic alphabet origins. MACDONALD presentation vol., p. 181-91, Princeton, N.J., 1933. ISIS

" Until more material similar to the Ras Shamra alphabet is found in Syria or elsewhere, the Ras Shamra alphabet will doubtless be regarded as a purely local phenomenon, as DHORME suggests. The model used for its formation still remains uncertain. In spite of hitherto unavailing efforts to identify the model, we may yet find that the Ras Shamra alphabet represents a reproduction, by men accustomed to clay, stylus and cuneiform, of a script which was already in local or general use, possibly coming originally from the region of Sinai and passing through such intermediate stages as are suggested by the Gezer potsherd, the BLISS fragment of Tell el-Hesi, the GRANT (Beth Shemesh) ostrakon and other yet undiscovered scripts. Into the development of that script may have entered contributions from Cretans, Aegean peoples, Hittites and others who, mingling with the Phoenicians, added each a share to its completion. Basically the proposition appears unassailable that Egypt furnished the principle, originally, upon which Semites constructed the alphabet. And this is not too far from the ancient tradition that ' the Phoenicians derived the art of letters from Egypt ' to make it appear that the tradition had been well founded."

Hippolyte-Boussac, P. Le lièvre d'Egypte. *Revue générale des sciences*, 44, 340-44, 1933. ISIS

Jackson, A. Egyptian neolithic barley. *Nature*, 131, 652, 1933. ISIS

" When, where and with what species man first began the cultivation of grain are questions intimately bound up with the development of our civilisation. Fresh light has been thrown on these questions by specimens of grain which were found a few years ago in the course of explorations carried out in Egypt by Miss G. CATON-THOMPSON and Miss E. W. GARDNER, who have given preliminary accounts of their work in two papers. The archaeological and geological evidence given in these papers shows that this grain was grown between 5.000 and 6.000 B.C. by a people in a Neolithic state of culture, living on the shores of a lake, which still exists, though now much smaller than in Neolithic times."

Lucas, A. "Cedar"-tree products employed in mummification. *Journal of Egyptian Archaeology*, 17, 13-21, 1931. ISIS

Méautis, Georges. L'origine égyptienne de l'idée de transsubstantiation. *Revue de l'histoire des religions*, 107, 5-7, 1933. ISIS

"La théorie actuelle de la transsubstantiation, comme l'a montré PIERRE LASSERRE s'appuie sur une idée métaphysique grecque : la *substance* de l'hostie est transformée alors que les *espèces* ou *apparences* demeurent. Ce n'est pas cependant en Grèce qu'il faut rechercher les origines de l'eucharistie, car on ne trouve rien dans la religion grecque qui puisse être rapproché de ce sacrement. Il n'en va pas de même pour l'Égypte. M. LOISY a déjà attiré l'attention sur un passage d'un papyrus magique de Londres où le magicien devait prononcer sept fois sur une coupe de vin la formule suivante : 'Tu es du vin, tu n'es pas du vin mais la tête d'Athéna; tu es du vin, tu n'es pas du vin mais les entrailles d'Osiris, les entrailles d'Iao Pakerbeth.' Inutile, je pense de relever la parenté de ces paroles avec celles de Matthieu 26, 26-28, 'Prenez et mangez car ceci est mon corps' ou 'Buvez-en tous car ceci est mon sang.' Le texte magique était cependant isolé et il aurait été quelque peu hasardeux d'édifier sur lui seul toute une théorie de l'origine de l'eucharistie chrétienne, s'il n'était pas, maintenant, confirmé et appuyé par la publication d'un nouveau document faite par M. H. I. BELL à qui la science doit déjà tant de précieuses trouvailles."

Newell, Lyman C. Chemistry in the service of Egyptology. *Jour. Chem. Education*, 10, 259-66, 1933. ISIS

Petrie, Flinders. Origin of the time pendulum. *Nature*, 132, 102, 1933. ISIS

Reinach, Théodore. Du rapport de valeur des métaux monétaires dans l'Egypte au temps des Ptolémées. *Revue des études grecques*, 41, 121-96, 1928. ISIS

"Dans la pratique l'inconvénient grave de l'irrégularité des poids était atténué par deux coutumes : 1. Les Égyptiens, même dans l'intérieur du pays, réglaient presque tous les gros paiements non par des versements effectifs de numéraire, mais par le virement en banque (*διαγραφή*) qui jouait un rôle encore plus important dans les transactions que le chèque chez nous, vu l'absence du billet de banque. 2. Quant aux transactions réglées en métal, les indigènes étaient habitués depuis des siècles à l'emploi de la balance. Il y a lieu de croire qu'ils n'y avaient pas renoncé lorsqu'ils adoptèrent la monnaie proprement dite, mais à poids irréguliers, comportant pour le moindre achat des chiffres considérables de drachmes."

Sudhoff, Karl. Krebsgeschwülste in altägyptischen Papyri? *Monatsschrift für Krebsbekämpfung*, p. 171-74, April 1933. ISIS

Toussoun, Le prince Omar. La géographie de l'Egypte à l'époque

arabe. Vol. 1. XVI+214 p., 7 maps. *Mémoires de la Société royale de géographie d'Egypte*, 8, 1926. ISIS

Ce premier volume est consacré à la Basse-Égypte (Asfal el-ard). Il y aura en tout cinq volumes : II. Le Fayoum (El-Fayoumia); III. La Haute Égypte (Aāla el-ard); IV. Les textes des auteurs arabes; V. Index. G. S.

Vetter, Q. Problem 14 of the Moscow mathematical papyrus. *Journal of Egyptian Archaeology*, 19, 16-18, 1933. ISIS

New explanation of how the Egyptian arrived at the equivalent of the following formula for the volume of the frustum of a pyramid : $(a^2 + ab + b^2)h/3$. R. C. A.

3. — BABYLONIA AND ASSYRIA

Allotte de la Fuije. Deux inscriptions inédites d'Oumma relatives à la navigation. *Revue d'assyriologie et d'archéologie orientale*, 25, 1-22, 1928. ISIS

Allotte de la Fuije. Mesures agraires et calcul des superficies dans les textes pictographiques de Djemdet-Nasr. *Revue d'assyriologie et d'archéologie orientale*, 27, 65-71, 1930. ISIS

Allotte de la Fuije. La table mathématique A. O. 6456. *Rev. d'assyriol.*, 29, 11-19, 1932. ISIS

Barrois, A. Poids de Neirab. *Revue d'assyriologie*, 24, 85-86, 1927. ISIS

" Parmi les objets découverts lors de notre première campagne de fouilles à Neirab, il y a lieu de mentionner un canard en basalte en tous points semblable aux poids babyloniens de ce type. La pesée, dont le résultat vient de m'être communiqué, accuse un poids moyen de 4 kg. 063. Ce poids est un peu supérieur au double de la quadruple mine de 2 kg. 020."

Belaiew, N. T. Au sujet de la valeur probable de la mine sumérienne. *Revue d'assyriologie et d'archéologie orientale*, 26, 115-27, 6 fig., 1929. ISIS

Vers l'an 2000 il existait au moins trois mines différentes

Di 491.14 $\pm$ 0.56 gr.
Dii 502.20 gr.
Diii 511.83 $\pm$ 0.56 gr.

Dávid, A. La mesure de capacité " matu " sur les tablettes de Kirkuk. La mesure de superficie " epinnu." *Revue d'assyriologie et d'archéologie orientale*, 25, 99-100, 1928. ISIS

Dávid, A. Opération dentaire en Babylonie. *Revue d'assyriologie et d'archéologie orientale*, 25, 95-97, 1928. ISIS

Jean, Charles-F. La condition de la femme dans la Basse-Mésopotamie d'après les documents suméro-akkadiens antérieurs au XVII^e siècle avant JÉSUS-CHRIST. *L'ethnographie*, 1-7, 15 avril, 1932. ISIS

Jean, Charles-F. L'origine des choses d'après une tradition sumérienne de Nippur. *Revue d'assyriologie et d'archéologie orientale*, 26, 33-38, 1929. ISIS

Marshall, A. E. An Assyrian text on glass manufacture. *Jour. Chem. Education*, 10, 267-69, 1933. ISIS

Largely a review of R. CAMPBELL THOMPSON's "The chemistry of the ancient Assyrians," London, 1925. T. L. D.

Neugebauer, O. Über die Lösung kubischer Gleichungen in Babylonien. *Gesellschaft d. Wissenschaften zu Göttingen* (*Nachrichten*, mathem.-physik. Kl.), 316-21, 1933. ISIS

Extraordinary discovery that six examples, in the British Museum texts, lead to the solution of cubic equations. The Babylonians of the second millenium B.C. were apparently able to solve equations of the form $x^3 + a_1x^2 + a_2x + a_3 = 0$. R. C. A.

Neugebauer, O. Das Pyramidenstumpfvolumen in der vorgriechischen Mathematik. *Quellen u. Studien zur Geschichte d. Math. Astron. u. Phys.*, 2, H. 4, 347-51, 1933. ISIS

Suggestion of ground for thinking that the Babylonians may have known the HERON formula,

$$V = h\left(\left(\frac{a+b}{2}\right)^2 + \frac{1}{3}\left(\frac{a-b}{2}\right)^2\right).$$ R. C. A.

Sayce, A. H. Additions to the list of names of parts of the body in Hittite. *Revue d'assyriologie et d'archéologie orientale*, 27, 165-67, 1930. ISIS

Scheil, V. Nouveaux présages tirés du foie. *Revue d'assyriologie et d'archéologie orientale*, 27, 141-54, 1930. ISIS

Schott, Albert. Eine assyrische Inschrift aus dem römischen Köln? *OLZ* 36, 276-79, 1 pl., 1933. ISIS

Schott, Albert. Zur Terminologie der mathematischen Keilschrifttexte. I. *ki ma-ṣi*. *Quellen und Studien zur Geschichte der Mathematik*, Abtg. B, 2, H. 4, 364-68, 1933. ISIS

Sidersky, D. La division de la circonférence en 360 parties. *Revue d'assyriologie et d'archéologie orientale*, 26, 31-32, 1929. ISIS

Thompson, R. Campbell. Assyrian medical prescriptions for diseases of the stomach. *Revue d'assyriologie et d'archéologie orientale*, 26, 47-92, 1929. ISIS

Thompson, R. Campbell. Assyrian medical prescriptions against *šimmatu* "poison." *Revue d'assyriologie et d'archéologie orientale*, 27, 127-35, 1930. ISIS

Thompson, R. Campbell. Assyrian prescriptions for treating bruises or swellings. *American Journal of Semitic Languages and Literatures*, 47, 1-25, 1930. ISIS

Thureau-Dangin, F. Le calcul de la surface d'un segment de cercle. *Rev. d'assyriol.*, 29, 26-28, 1932. ISIS

Thureau-Dangin, F. Clepsydre babylonienne et clepsydre égyptienne. *Rev. d'assyriol.*, 30, 51-52, 1933. ISIS

Thureau-Dangin, F. La division du cercle. *Revue d'assyriologie et d'archéologie orientale*, 25, 187-88, 1928. ISIS

" La division du cercle en 360 degrés, du degré en 60 minutes, de la minute en 60 secondes, de la seconde en 60 tierces etc., nous vient de Babylonie par l'intermédiaire des Grecs. Les Babyloniens divisaient le cercle en 12 parties appelées *bêru* et chaque *bêru* en 30 unités qu'ils désignaient par l'idéogramme UŠ. Cette division s'explique par le fait qu'ils divisaient le jour en 12 *bêru* de 30 UŠ, à l'image de l'année conçue comme formée idéalement de 12 mois de 30 jours. De la division du jour est sortie celle du cercle; les mesures de temps sont devenues des mesures d'arc. La division du cercle en 360 degrés a donc une origine qu'on peut dire ' naturelle.' Il n'en est pas de même de la division sexagésimale du degré. La minute, la seconde, la tierce ne sont pas ' données ' par la nature. Les Babyloniens n'ont divisé le degré sexagésimalement que parce qu'ils avaient un système de numération sexagésimal. Et ce système de numération, ils le tenaient des Sumériens. C'est en dernière analyse aux Sumériens que remonte la division du cercle dont les Babyloniens ont fait ensuite usage."

Thureau-Dangin, F. Esquisse d'une histoire du système sexagésimal. 81 p. Paris, GEUTHNER, 1932. ISIS

Mise au point magistrale. G. S.

Thureau-Dangin, F. La grande coudée assyrienne. *Revue d'assyriologie*, 22, 30, 1925. ISIS

Thureau-Dangin, F. La graphie du système sexagésimal. *Revue d'assyriologie et d'archéologie orientale*, 27, 73-78, 1930. ISIS

Thureau-Dangin, F. La mesure du "Qa." *Rev. d'assyriol.*, 29, 189-92, 1932. ISIS

Thureau-Dangin, F. Notes assyriologiques. *Revue d'assyriologie*, 29, 131-42, 1932. ISIS

Le théorème de PYTHAGORE. La clepsydre chez les Babyloniens. Carré et demi-cercle. La ville ennemie de Marduk.

Thureau-Dangin, F. Numération et métrologie sumériennes. *Revue d'assyriologie et d'archéologie orientale*, 18, 123-42, 1921. ISIS

" Prétendre que le système sexagésimal tire son origine du nombre des jours de l'année, ou de telle propriété du cercle, ou du rapport entre le diamètre apparent du soleil et l'écliptique, c'est admettre implicitement que les Sumériens auraient eu, avant l'invention du système sexagésimal, un autre système de numération : hypothèse aussi gratuite que peu vraisemblable. Les premières origines du système sexagésimal remontent aux temps lointains où les Sumériens commencèrent à acquérir la notion d'une unité supérieure à la dizaine. Par l'analyse des noms de nombre, on voit comment ils ont passé de 1 à 10 : ils ont compté de 1 à 5 sur les cinq doigts de la main, puis 5 + 1, 5 + 2, etc..., jusqu'à 10. Au-delà de 10 ils se sont arrêtés à 60 au lieu d'aller jusqu'à 100. C'est un fait qu'il suffit de constater et qu'il serait, croyons-nous, vain de vouloir ' expliquer.' A coup sûr, l'usage de compter par soixantaines n'a pas été le résultat de quelque considération ' savante,' d'ordre astronomique ou géométrique. La réflexion n'y a sans doute pas eu plus de part que dans l'habitude que nous avons prise de compter, après soixante, ' soixante-dix ' au lieu de ' septante,' ce qui est bien une première ébauche de ' système sexagésimal.' " " Dans une étude publiée dans le *Journal Asiatique*, janvier-février 1909, sous le titre *L'U, le Qa et la Mine, leur mesure et leur rapport*, j'ai essayé de démontrer que l'ensemble des mesures employées par les Sumero-Accadiens formait un système fermé, où les mesures de longueur, de capacité et de poids étaient reliées par un rapport simple. Depuis, de nouvelles données permettent de serrer le problème de plus près. Il importe d'abord de préciser autant que possible la mesure de chacune des trois unités fondamentales, la coudée, le *qa* et la mine."

Thureau-Dangin, F. L'origine du système sexagésimal. *Revue d'assyriologie et d'archéologie orientale*, 25, 115-18, 1928. ISIS

Discussion du mémoire de O. NEUGEBAUER (Göttingen, 1927).

Thureau-Dangin, F. L'origine du système sexagésimal. Un post-scriptum. *Revue d'assyriologie et d'archéologie orientale*, 26, 43, 1929. ISIS

Correction by O. NEUGEBAUER to *R. A.*, 25, 116.

Thureau-Dangin, F. Poids en hématite conservés au Musée Britanique. *Revue d'assyriologie*, 24, 69-73, 1927. ISIS

" Le poids de la mine, unité fondamentale du système pondéral sumero-accadien, peut être évalué à 505 grammes avec une marge d'erreur extrêmement réduite (cf. *RA*, XVIII, pp. 129 et suiv.) Il s'agit de la mine normale

dont on connaît une forme simple, double ou quadruple et qui est attestée depuis au moins la dynastie d'Ur jusqu'au temps des ACHÉMÉNIDES."

Thureau-Dangin, F. (1) Le prisme mathématique AO 8862. *Rev. d'assyriol.*, 29, 1-10, 4 pl. Un post-scriptum, *Ibid.* 89-90. (2) Notes assyriologiques. *Ibid.* 21-28, 77-88, 131-42. (3) Mathématique babylonienne. *Ibid.* 59-66. (4) La ville ennemie de Marduk. *Ibid.* 109-19, 1 fig., 1932. ISIS

Reviewed by VOGEL, *Mitteilungen zur Geschichte der Medizin*, 32, 80, 1933.

Thureau-Dangin, F. Le système ternaire dans la numération sumérienne. *Revue d'assyriologie et d'archéologie orientale*, 25, 119-21, 1928. ISIS

" Dans la numération sumérienne l'étape sexagésimale n'a été atteinte qu'après un arrêt à 10 et l'étape décimale après un arrêt à 5 (voir *RA*, XVIII, pp. 123 ss.). L'étape quinaire elle-même semble avoir été précédée d'une étape ternaire. En effet, le nombre 3, à savoir *eš*, a le sens de ' pluralité ' *(ma'dūtu)* et est employé comme suffixe du pluriel. Ce fait est, semble-t-il, l'indice qu'originairement la numération s'arrêtait à 3."

Vogel, Kurt. Zur Berechnung der quadratischen Gleichungen bei den Babyloniern. *Unterrichtsblätter für Mathematik und Naturwissenschaften*, 39, 76-81, 1933. ISIS

" Das bedeutendste Forschungsergebnis der letzten Jahre auf dem Gebiete der Geschichte der Mathematik ist die Entdeckung der quadratischen Gleichung bei den Babyloniern. Eine Reihe von Aufgaben, die zum Teil veröffentlicht sind,führt auf Gleichungssysteme mit zwei Unbekannten,wobei eine Gleichung linear ist, während die andere das Produkt oder die Quadratsumme der Unbekannten enthält. Manchmal ist nur die Lösung angegeben, in andern Fällen wird diese aber auch nach einer ' Formel ' vorgerechnet. Aus den teilweise recht verwickelten Problemstellungen, in denen sogar geometrische Gebilde verschiedener Dimension addiert werden, ergibt sich, dass die Aufgaben schon von dem geometrischen Hintergrund losgelöst sind, dem sie ursprünglich ihre Entstehung verdanken, so dass man sie vielfach als ' Algebra ' ansprechen muss. Besonders hochstehend sind gerade die ältesten Texte, vier Aufgaben auf einem vierseitigen Prisma im Louvre (AO 8862), aus der Zeit der 1. babylonischen Dynastie; die vorausgehenden Vorarbeiten sind also noch weit früher anzusetzen. Die wichtige Frage, ob man sich der Doppeldeutigkeit der Lösung bewusst war, wird von NEUGEBAUER, dem Herausgeber und Erklärer eines grossen Teiles der in Frage stehenden Texte, bejaht. Er kommt auf Grund der dritten Aufgabe auf dem Louvre-Prisma zu dem ' unabweislichen ' Schluss, ' dass man sich erstens darüber klar war, dass Gleichungen der hier behandelten Art zwei prinzipiell gleichwertige Ansätze ' (einen für x bzw. für y) ' zur Lösung gestatten und dass man zweitens auch die Doppeldeutigkeit der Lösung einer quadratischen Gleichung kannte (es sei denn, dass eine der Lösungen negativ wird).' "

Vogel, Kurt. Eine Pyramidenstumpf-Aufgabe bei den Babyloniern. *Archiv f. Orientforschung*, 8, 220, 1933. ISIS

"So erbringt meines Erachtens die neue Aufgabe den Beweis, dass um 2000 v. Chr. in Babylonien nicht nur eine Näherung für Stumpfvolumina bekannt war, sondern auch die genaue Formel. Ausserdem zeigt die weitgehende Uebereinstimmung im Wortlaut des Textes, dass bei den überlieferten Beispielen griechischer rechnender Geometrie eine uralte babylonische Tradition in Betracht zu ziehen ist."

4. — GREECE

Bell, H. J.; Nock, A. D.; Thompson, Herbert. Magical texts from a bilingual papyrus. 55 p., 3 pl. (*Proceedings of the British Academy*, 17). London, MILFORD, 1932. ISIS

Blanchet, Léon. La préparation du "Cogito" cartésien dans la philosophie grecque. *Rev. de métaphys. et de morale*, 40, 187-230, 1933. ISIS

Dijksterhuis, E. J. De beoefening van de Grieksche wiskunde als element van klassieke vorming. Voordracht gehouden voor de groep Classici van het Genootschap van Leeraren aan Nederlandsche Gymnasiën te Utrecht op 28 Februari 1931. 11 p. ISIS

Dijksterhuis, E. J. Het getal in de Grieksche wiskunde. Openbare les gehouden bij de aanvaarding van het ambt van privaat-docent in de geschiedenis der wiskunde aan de Universiteit van Amsterdam op 11 October 1930. 18 p. Groningen, NOORDHOFF, 1930. ISIS

Public lecture opening the author's course on the history of mathematics at the University of Amsterdam. Dealing with the idea of number in Greek mathematics. G. S.

Foster, William. Chemistry and Grecian archeology. *Jour. Chem. Education*, 10, 270-77, 1933. ISIS

Heath, Sir Thomas L. Greek astronomy. LVII+192 p. (The library of Greek thought.) London, DENT, 1932. ISIS

Reviewed by E. J. WEBB, *Nature*, 132, 119, 1933; by GINO LORIA, *Archeion*, 15, 109, 1933; by DAVID EUGENE SMITH, *Scripta mathematica*, 1, 256-58, 1933; by E. ZINNER, *Vierteljahrsschrift der astronomischen Gesellschaft*, 68, 47, 1933.

Nock, A. D. Greek magical papyri. *Journal of Egyptian Archaeology*, 15, 219-35, 1929. ISIS

Rome, A. Premiers essais de trigonométrie rectiligne chez les Grecs.

Annales de la Société scientifique de Bruxelles, 52, série A, 271-74, 1932. ISIS

" THÉON D'ALEXANDRIE ne cite pas le titre de l'ouvrage d'HIPPARQUE sur la trigonométrie. HÉRON n'utilise pas HIPPARQUE, mais un mémoire sur les polygones inscrits. PAPPUS reproduit un essai maladroit de résolution d'un triangle rectiligne, dû probablement à HIPPARQUE. Tous ces textes nous font assister à la naissance de la trigonométrie."

Rome, A. Premiers essais de trigonométrie rectiligne chez les Grecs. *L'Antiquité classique*, 2, 177-92, 3 fig., 1933. ISIS

Contents : Un passage de THÉON D'ALEXANDRIE; Les calculs de polygones chez HÉRON D'ALEXANDRIE; Nature du livre des cordes; Premiers essais de résolution de triangles plans.

Temkin, Owsei. Geschichte des Hippokratismus im ausgehenden Altertum. *Kyklos*, 4, 1-80, 1932. ISIS

1. Der Hippokratismus im 2. Jahrhundert; 2. Das 3. Jahrhundert und der lateinische Westen; 3. Hippokratismus und Galenismus bis zum Ausgang der Schule von Alexandria; 4. Die Kanonisierung von HIPPOKRATES und GALEN.

Zuretti, Carlo Oreste. Proposte di letture a luoghi della " Collection des anciens alchimistes grecs publiée par M. BERTHELOT." *Byzantinische Zeitschrift*, 30, 676-81, 1929-30. ISIS

5. — ROME

Collingwood, R. C. Roman Britain. XII+160 p. Oxford, Clarendon Press, 1932. ISIS

Reviewed by S. E. WINBOLT, *Geographical Journal*, 80, 57, 1932. The 1923 book by the same author with the same title is here expanded and rewritten. C. W. A.

Rickard, T. A. The mining of the Romans in Spain. *Journal of Roman Studies*, 18, 129-43, 1 pl., 1928. ISIS

Sudhoff, Karl. Eine Stützschiene für einen kranken Unterschenkel aus römischer Zeit (von der Mosel). Estratto dagli Atti dell VIII Congresso Internazionale di Storia della Medicina, Roma 22-27 Settembre 1930, 6 p. Pisa, LISCHI, 1931. ISIS

" Mit Bewunderung aber kann man diese Stützschiene, bisher einzig in ihrer Art, als neuen Beweis dafür erkennen, dass die römische Chirurgie, und mit einiger Bestimmtheit wohl die römische Militärchirurgie, einen beachtlichen Hochstand erreicht hatte. Zusammengehalten mit dem ' Stelzfuss von Capua ' kann diese Stützschiene von der Mosel uns als Beispiel römischer prothetischer und Bandagen-Technik, und damit römischer

chirurgischer Umsicht und Leistungsfähigkeit selbst in ihren Aussenbezirken dienen und als solches willkommen sein."

Whittick, G. Clement. Notes on some Romano-British pigs of lead. *Journal of Roman Studies*, 21, 256-64, 1 fig., 1931. ISIS

" Of the five great lead-producing districts of Roman Britain, the limestone uplands of the Mendips in Somerset have yielded evidence of Roman mining activities which, however incomplete, is still the richest and fullest from a material and chronological point of view so far discovered in this country. To the Mendip mines we owe not only the earliest and latest dated specimens in the British series of inscribed pigs of Roman lead, but also the heaviest. Since the appearance at the beginning of this century of the classic article by GOWLAND, the full number of the Mendip pigs has been listed by various authorities, but a recent examination of two of them shows that the existing accounts need supplementing and correcting in certain important details."

II. — MIDDLE AGES

6. — MIDDLE AGES *(generalities)*

Bourdon, Jean. Les méthodes de la démographie historique ; la population de la France au Moyen Age, d'après les travaux de M. F. LOT. *Bulletin of the international committee of historical sciences*, 5, 588-95, 1933. ISIS

Hoffmann, Gerda. Beiträge zur Lehre von der durch Zauber verursachten Krankheit und ihrer Behandlung in der Medizin des Mittelalters. 37 p. (Reprinted from *Janus*, vol. 37) Leiden, BRILL, 1933. ISIS

" Es soll in dieser Arbeit für die Untersuchung der Krankheit verwertet werden, die in der Zauberpathologie des Mittelalters die grösste Rolle spielt, der durch Zauber verursachten sexuellen Insuffizienz und Sterilität. Die älteste uns bekannt gewordene Behandlung des Themas findet sich in der *Pantechne* des KONSTANTIN VON AFRIKA, der 1087 starb, und zwar im achten Buch der *Practica* unter der Überschrift *de his qui coire non possunt*, in der Druckausgabe vom Jahre 1515, den bekannten *Opera Ysaaci*, als Kapitel 29."

Hollnsteiner, Johannes. Die weltgeschichtliche Bedeutung des Nominalismus. *Bulletin of the international committee of historical sciences*, 5, 171-73, 1933. ISIS

Pellegrini, Francesco. La medicina militare nel regno di Napoli dall' avvento dei Normanni alla caduta degli Angioini, 1139-1503. 316 p. Verona, CABIANCA, 1932. ISIS

Reviewed by D. G., *Rivista di storia delle scienze*, 24, 31, 1933; by HABER-

LING, *Mitteilungen zur Geschichte d. Medizin*, 32, 117, 1933; by DAVIDE GIORDANO, *Archeion*, 15, 132, 1933; by JAMES J. WALSH, *Medical Life*, 39, 651-52, 1932.

Ruska, Julius. Alchemie in Spanien. *Angewandte Chemie*, 46, 10 p. 1933. ISIS

Sa'di, Lutfi M. Reflection of Arabian medicine at Salerno and Montpellier. *Annals of Medical History*, 5, 215-25, 5 fig., 1933. ISIS

Schnabel, Paul. Der verlorene Speirer Codex des *Itinerarium Antonini*, der *Notitia dignitatum* und anderer Schriften. *Sitzb. der preuss. Akad.* phil.-hist. Kl., 242-57, 1926. ISIS

Simon, Paul. Erkenntnistheorie und Wissenschaftsbegriff in der Scholastik. 27 p. (*Philosophie und Geschichte*, 14). Tübingen, MOHR, 1927. ISIS

Simon, Paul. Die Idee der mittelalterlichen Universität und ihre Geschichte. 38 p. (*Philosophie und Geschichte*, 38). Tübingen, MOHR, 1932. ISIS

Sudhoff, Karl. Grossleistung Italiens in der Medizin des Mittelalters. Atti dell' VIII Congresso Internazionale di Storia della Medicina, Roma 22-27, Settembre 1930. 7 p. Pisa, LISCHI, 1931. ISIS

Tànfani, Gustavo. Una illustre famiglia di medici Padovani nel medio evo. *Rivista di storia delle scienze mediche*, 24, 97-112, 3 facs., 1933. ISIS

Apropos of the SANTA SOFIA family. G. S.

Tànfani, Gustavo. Medizinische Bücher im Mittelalter (Beitrag zur Geschichte der paduanischen Ärztefamilie di SANTA SOFIA). *Sudhoffs Archiv für Geschichte der Medizin*, 26, 191-95, 1933. ISIS

Thorndike, Lynn. Notes on some Latin manuscripts at Wolfenbüttel in natural science, medicine, alchemy, and astrology. *Speculum*, 8, 175-79, 1933. ISIS

"The following notes, based upon a recent examination of the manuscripts in question, are offered in correction of the notices of the same which appear in the elaborate but too often inaccurate catalogue of HEINEMANN."

Willard, James F. Progress of medieval studies in the United States of America and Canada. Bulletin no. 11. 57 p. Boulder, Col., Mediaeval Academy of America and the University of Colorado, 1933. ISIS

7. — BYZANTIUM

Bréhier, Louis. Byzance et Empire byzantin. *Byzantinische Zeitschrift*, 30, 360-64, 1929-30. ISIS

Darkó, Eugen. Wirkungen des Platonismus im griechischen Mittelalter. *Byzantinische Zeitschrift*, 30, 13-17, 1929-30. ISIS

" Der altererbte Kampf zwischen Hellas und Asien ist in der Theologie und Philosophie unter dem Namen des PLATON und ARISTOTELES, in der Literatur und Kunst unter der Parole des klassizisierenden Archaismus und des Orientalismus durch die Byzantiner weitergeführt worden. In der Kirche und der hohen Politik hat der Orient den Sieg davongetragen, aber in der profanen Literatur und Kunst gewann nach erbittertem Kampfe doch das Erbe des Hellenentums die Oberhand und rettete sich, im eigenen Reiche durch einen katastrophalen Schicksalsschlag unmöglich gemacht, in das Abendland hinüber, wo es in der italienischen Renaissance zum Segen Europas zu neuer Blüte emporgewachsen ist."

Diehl, Charles. De quelques croyances byzantines sur la fin de Constantinople. *Byzantinische Zeitschrift*, 30, 192-96, 1929-30. ISIS

Mercati, S. G. Onirocritico lunare secondo i codici Vaticano Greco 342 e Berlinese Greco 168. *Byzantinische Zeitschrift*, 32, 263-66, 1932. ISIS

Stephanides, Michael. Les savants byzantins et la science moderne. Renaissance et Byzance. *Archeion*, 14, 492-96, 1932. ISIS

III. — ORIENTAL SCIENCE AND CIVILIZATION

8. — CENTRAL ASIA

Rachmati, G. R. Zur Heilkunde der Uiguren. 25 p., 2 pl. *Sitz. d. pr. Ak. d. Wiss.*, ph.-hist. Kl., 451-73, Berlin, 1930. ISIS

Reviewed in *T'oung Pao*, 28, 198-99, 1931.

EASTERN ASIA

(Including works relative to the whole of Buddhist Asia or to India, Central and Eastern Asia combined)

Bénazet, A. De quelques pratiques de la médecine indigène chez les Cambodgiens. *L'ethnographie*, 29-44, ill., 15 avril 1932. ISIS

Colani, Madeleine. Recherches sur le préhistorique indochinois. *BEFEO*, 30, 299-422, 28 pl., 73 fig., 1930. ISIS

Cordier, Henri ; Roland-Cabaton, Mme. M. A. Bibliotteca indosinica. Dictionnaire bibliographique des ouvrages relatifs à la péninsule indochinoise. 311 p. *(Public. de l'Ecole franç. d'Extrême-Orient.)* Paris, LEROUX, 1932. ISIS

Dangel, Richard. Siamesische Traumdeutungskunst. *Asia major*, 7, 379-408, 1931. ISIS

Hôbôgirin. Dictionnaire encyclopédique du Bouddhisme d'après les sources chinoises et japonaises, publié sous la direction de SYLVAIN LÉVI et J. TAKAKUSU. Rédacteur en chef, PAUL DEMIÉVILLE. Premier fasc.: *A-Bombai*. VI+96+XVI p. Deuxième fasc.: *Bombai-Bussokuseki*. 95 p., 10 pl., 2 fig. Tôkyô, Maison franco-japonaise, 1929-30. ISIS

Review of part 1 by E. GASPARDONE, *BEFEO* 30, 165-68, 1930; of part 2 by P. PELLIOT, *T'oung Pao*, 28, 95-104, 1931.

9. — INDIA

Bamboat, Zenobia. Les voyageurs français dans l'Inde aux XVII^e^ et XVIII^e^ siècles. Introduction de A. MARTINEAU. 200 p., 4 pl. Paris, LEROUX, 1933. ISIS

Chakravarti, Gurugovinda. Growth and development of permutation and combination in India. *Bull. Calcutta Math. Soc.*, 24, 79-88, 1932. ISIS

Chakravarti, Gurugovinda. Typical problems of Hindu mathematics. *Ann. Bhandarkar Orient. Res. Inst.*, 14, 87-102, Poona, 1933. ISIS

Coomaraswamy, Ananda K. On translation : Māyā, Deva, Tapas. *Isis*, 19, 74-91, 1933. ISIS

" Considered from a literary point of view, and still more with reference to their original value as *sādhana*, means to realisation, existing translations of Vedic texts may be described as amounting to little more than ' cribs,' of real use only as tools and in the hands of students who can and will take pains to consult the original texts. This is tantamount to saying that the Sacred Books of the East are even today inaccessible to those, and these the vast majority, who cannot read or even refer to the original texts, If, as many think, the only possible *rapprochement* of the West and East must be effected intellectually, herein lies the primary obstacle to a mutual understanding. Mistranslation is not to be attributed to a lack of assiduity, nor to an inadequate mastery of Oriental languages on the part of scholars, but much more to their inadequate use of English." " In illustration of what has been said I offer *suggestions raisonnées* as to the rendering of three well known Sanskrit words, viz. Māyā, Deva, and Tapas, proposing that they should be rendered con-

sistently by " Magic," " Angel," and " Intension, " or retained in their original forms untranslated."

Gāṅguli, Sāradākānta. The Indian origin of the modern place-value arithmetical notation. Part IV. The evidence of inscriptions. *American Mathematical Monthly*, 40, 154-57, 1933. ISIS

Gāṅguli, Sāradākānta. India's contribution to the theory of indeterminate equations of the first degree. *J. Indian Math. Soc.*, 19, 110-20, 129-42, 1931 ; 19, 153-68, 1932. ISIS

Joseph, T. K. The SAINT THOMAS traditions of South India. *Bulletin of the international committee of historical sciences*, 5, 560-69, 1 pl., 1933. ISIS

Lévi, Sylvain. Matériaux pour l'étude du système Vijñaptimātra. 206 p., frontispiece (*Bibliothèque de l'école des hautes études*, no. 260). Paris, HONORÉ CHAMPION, 1932. ISIS

Depuis quelque dix ans un grand nombre de travaux importants ont été consacrés à VASUBANDHU aussi bien en Occident qu'en Orient. Mentionnons par exemple la traduction de l'*Abhidharma kośa* par L. DE LA VALLÉE POUSSIN (Louvain 1923-25; *Isis*, 10, 113; 11, 415). SYLVAIN LÉVI avait publié lui-même le texte sanscrit de la Vingtaine et de la Trentaine de VASUBANDHU en 1925 (même collection, no. 245) — écrits auxquels les écoles bouddhiques du Japon attachent une très grande importance. Il en publie maintenant la traduction française, établie avec l'aide de plusieurs savants japonais, et y ajoute d'autres matériaux précieux : analyse résumée du système Vijñaptimātra; historique de ce système, introduction à la traduction japonaise du *Tch'eng wei che louen* par D. SHIMAJI, adaptée du japonais, par PAUL DEMIÉVILLE; La notation de tréfonds (ālaya vijñāna) (extrait du *Fan yi ming yi tsi*); des corrections assez nombreuses au texte sanscrit, et un lexique abondant des termes techniques (26 p.).

Les deux œuvres qui forment le noyau du présent ouvrage sont ainsi caractérisées : " Le premier traité, en vingt vers (Viṁśikā ou Viṁśatikā), est une sorte d'introduction au système, plutôt critique que constructive. VASUBANDHU, avant d'exposer en détail sa propre doctrine de l'idéalisme absolu, s'attache à réfuter les objections de principe qu'on peut lui opposer à l'intérieur de l'église bouddhique elle-même; puis il s'attaque à la théorie atomique des Vaiśeshikas, l'interprétation physique de l'univers la plus puissante que le génie hindou ait élaborée, et qui s'était insinuée dans le bouddhisme, jusque chez ces Vaibhāshikas du Cachemire que VASUBANDHU avait longtemps suivis avec sympathie. Sa critique de l'atome, où s'affirme la vigueur de sa dialectique, est restée classique pendant des siècles. L'Atome mis hors de cause, ce n'est plus qu'un jeu pour lui de montrer les insuffisances de la thèse matérialiste en général, tandis que les données en apparence les plus réfractaires à la thèse idéaliste, la mémoire, le rêve, la mort, s'intègrent sans difficulté dans ce système. Le traité en trente vers (Triṁśikā), qui passe, et probablement à juste titre, pour la dernière en date des œuvres

de VASUBANDHU, réalise ce tour de force d'exposer tout un système de philosophie en soixante lignes de seize syllabes. L'auteur y condense tant de problèmes et de solutions que des générations de commentateurs ont pu, dans l'Inde et hors de l'Inde, y appliquer leur sagacité sans épuiser la matière."

L'auteur ne discute pas la date de VASUBANDHU. Dans mon *Introduction* (1, 350), ayant accepté les conclusions de NOËL PERI (1911), je l'avais placé dans la première moitié du IV^e^ siècle, mais cette date est fort discutée, et d'autres savants le placeraient plutôt au V^e^ siècle, et même dans la seconde moitié. G. S.

Masson-Oursel, P.; Willman-Grabowska, H. de; Stern, Philippe. L'Inde antique et la civilisation indienne. XXII+506 p., 16 pl., 24 fig., 5 maps. (*L'Evolution de l'humanité*, dirigée par HENRI BERR, XXVI). Paris, La Renaissance du Livre, 1933. ISIS

" L'Inde doit en partie son prestige à son mystère. Mais ce mystère a deux causes : l'absence d'une histoire indienne, et la vocation de l'Inde pour la spiritualité. Voici un livre qui montre ce qui est connu dans le chaos de l'indianité, sans négliger de mettre en relief ce qu'il y a d'original et d'unique dans le fait indien. Analysée en ses principaux éléments, l'Inde apparaît moins légendaire, mais plus réelle, plus humaine. Les faits essentiels de son passé sont ceux qui la mirent en contact avec l'Hellénisme, avec les Huns, avec la Chine, avec l'Islam. Ses parlers, ses mœurs, son panthéon l'apparentent à nous, Européens, comme membres de la communauté indo-européenne. Ses épopées se laissent confronter avec les poèmes homériques, et certaines de ses drames ressemblent à du SHAKESPEARE. Cependant le régime des castes, la croyance en la transmigration, la religion de secte l'opposent au reste du monde, et la singularité de ses aspirations finit par lui façonner une structure mentale sans analogue. P. MASSON-OURSEL n'eut qu'à l'étudier du point de vue de la ' philosophie comparée ' pour mettre en évidence ce que l'Inde possède en commun avec d'autres civilisations et ce qu'elle possède seule. Étranges contrastes, qui se retrouvent dans l'art. Illustration d'une scolastique, cet art mérite les deux épithètes dont on a gratifié le Moyen Âge : ' Énorme et délicat.' Il s'est mis avec une égale conviction au service du désintéressement et au service de la jouissance, attestant le double aspect d'une âme partagée entre l'ascétisme et la volupté. Écrit par d'éminents spécialistes, largement illustré, abondant en citations qui en font comme une anthologie, ce livre constitue un tableau unique de la vie de l'Inde ancienne dans ses manifestations diverses."

Masson-Oursel, Paul. L'Inde n'a-t-elle connu qu'un mysticisme " incomplet "? *R. de métaphysique et de morale*, 40, 355-62, 1933. ISIS

Masson-Oursel, Paul. La pensée à rebours dans l'Inde antique. *Journal de psychologie*, 29, 585-87, 1932. ISIS

Résumé d'une communication faite à la Société de psychologie le 17 décembre 1931.

Müller, Reinhold F. G. On an origin of the Caraka and Suśruta

Samhitās. *Journal of the Royal Asiatic Society*, 323-27, 1933.

ISIS

" Thus the sources, which alone have been used here, do not prove that one of the roots of scientific Indian medicine had its origin in the Metiterranean region. It may be inferred that a considerable part of Indian medicine, including its surgery, developed about the beginning of the Christian era, as it is said to have originated in the north-west of India; the possibility of Hellenistic influence upon it, however, cannot be entirely denied."

Pullé, Francesco L. La cartografia antica dell' India. Parte III. Il secolo delle scoperte. XXVI+182 p. (*Studi italiani di filologia Indo-Iranica*, 10). Firenze, CARNESECCHI e Figli, 1932. ISIS

Reviewed by C. E. A. W. OLDHAM, *Geographical Journal*, 80, 255-57. " This part deals with the discoveries of the 13th to the 15th centuries and of the early Portuguese navigators down to the close of the 16th century. The method followed is to trace the evolution of the cartography of India and the Far East by studying the delineation by each cartographer with reference to his individual knowledge and the general knowledge existing in his time." C. W. A.

Ray, Prafulla Chandra. Life and experiences of a Bengali chemist. VIII+257 p. Calcutta, CHUCKERVERTTY, CHATTERJEE, 1932. ISIS

There are several reasons why this book is of interest to the readers of *Isis*.

It is the autobiography of the leading chemist of India, himself the author of many researches, the founder of the Indian Chemical Society and the teacher of many of its members, to whom advanced instruction in chemistry, the growth of the spirit of research, and the development of modern chemical industry in India are largely due. The life of Sir P. C. RAY is thus in great measure an account of the history of modern chemistry in India.

The author is a student of the history of chemistry and the leading authority on the chemistry of the ancient Hindus. An article by him on " The chemical knowledge of the Hindus of Old " appeared in *Isis*, 2, 322-25, 1919; his " History of Hindu chemistry," 2 vols., has been reviewed in *Isis*, 3, 68-73, 1920; 9, 555-56, 1927; and his " Makers of modern chemistry " has been reviewed in *Isis*, 9, 574-75, 1927. Something of his historical studies inevitably appears in the book—a letter from BERTHELOT is reproduced in facsimile—and his remarks about contemporary European and Hindu chemists and methods of teaching are raw material for the future student of the chemistry of the present time.

The book is divided into two parts : Part I, Autobiographical; and Part II, Educational, industrial, economic and social. The second part gives a very clear idea of present conditions and problems of India and ought also to be of value to the historian of the future. The book has a good index. We are sorry that it does not contain a portrait of its author. T. L. D.

10. — CHINA

Duyvendak, J. J. L. WONG's system for arranging Chinese characters. The revised four-corner numeral system by Y. W. WONG. *T'oung Pao*, 28, 71-77, 1931. ISIS

Discussion of the WONG system which I criticized in *Isis*, 14, 527. G. S.

Erkes, Eduard. Spuren chinesischer Weltschöpfungsmythen. *T'oung Pao*, 28, 355-68, 1931. ISIS

Forke, Alfred. Die Anfänge des Idealismus in der chinesischen Philosophie. *Asia major*, 9, 141-54, 1933. ISIS

Franke, O. Das Tsĕ tschi t'ung kien und das T'ung kien kang-mu, ihr Wesen, ihr Verhältnis zueinander und ihr Quellenwert. *Sitzb. der preuss. Akad.* phil.-hist. Kl., 103-44, 1930. ISIS

Apropos of the Tzū chih t'ung chien and the T'ung chien kang mu, the main sources of Chinese history (see *Introduction*, 1, 778, and by index). G. S.

Hodous, Lewis. The introduction of Buddhism into China. MACDONALD presentation vol., p. 225-35, Princeton, N. J., 1933. ISIS

"According to our present knowledge of the matter, the early stages in the establishment of Buddhism are quite clear in outline. In the first century of the Christian era, Buddhism was already present. The dream of MING TI and the so-called embassy to India are the inventions of a later time. But though Buddhism was present, it was not very active. In the second century we find Buddhism more firmly established at the capital and also in other centers. The foreign missionaries were engaged in the work of translation of the sutras. Even at that time there were also Chinese monks and laymen associated with them. In the middle of the century a temple was built by the emperor in the palace enclosure. At first the new religion was closely associated with Taoism and was regarded as a graft upon the same. The incursions of the Taoists into the realm of politics and social efforts discredited Taoism and led to the final separation of the two systems. This separation in the two religions prepared the way for the interpenetration of Chinese life with the spiritual vision of the Mahayana, and the creation of a new Buddhism."

Krause, F. E. A. Über die Kenntnis europäischer Geschichte im heutigen China. *Asia major*, 9, 155-68, 1933. ISIS

Apropos of the *P'u t'ung po k'ê hsin ta tz'u tien* published in Shanghai 1911—a general encyclopaedia in 15 vols. G. S.

Krumbiegel, J. Säugetierkenntnisse im ältesten China. *Zeitschrift für Säugetierkunde*, 2, p. 198, 1927/29. ISIS

Liang, Backiang. Überblick über das seltenste chinesische Lehrbuch der Medizin " Huang-Ti Nei-ching." *Sudhoffs Archiv für Geschichte der Medizin*, 26, 121-45, 4 fig., 1933. ISIS

Moule, A. C. The use of the Cross among the Nestorians in China. *T'oung Pao*, 28, 78-86, 1931. ISIS

11. — JAPAN

Hayashi, T. On the binomial expansion, and the power-series form or other sequence-limit form of a root of an equation in the old Japanese mathematics. *Tohoku Math. J.*, 35, 345-97, 1932. ISIS

Hayashi, T. On the treatment of regular polygons in the old Japanese mathematics. *Tohoku Math. J.*, 36, 135-81, 1932. ISIS

Hotta, Masatami. Sketch of the moon made by him in the Bunkwa era (1813). *The Heavens*, no. 123, p. 337-40, ill., July 1931 (in Japanese). ISIS

Takayama, Shun. Développement de la philosophie occidentale au Japon. *Ex Oriente*, 1, 81-87, 1925. ISIS

12. — ISRAEL

(Including works devoted to Palestine)

Doubnow, Simon. Histoire moderne du peuple juif (1789-1914). Trad. du russe par S. JANKÉLÉVITCH. 2 vol. 800+896 p. Paris, PAYOT, 1933. ISIS

Feldman, W. M. Rabbinical mathematics and astronomy. VIII+232 p. London, CAILINGOLD, 1931. ISIS

Reviewed by SOLOMON GANDZ, *Isis*, 19, 208-12, 1933.

Gordlevsky, Wl. Zur Frage über die " Dönme." (Die Rolle der Juden in den Religionssekten Vorderasiens). *Islamica*, 2, 200-18,1926. ISIS

Groenman, A. W. Die Zahl 24 bei den Juden im Altertum. *Acta orientalia*, 7, 241-74, 1929. ISIS

Mann, Jacob. Texts and studies in Jewish history and literature. Vol. 1. XVI+728 p., 27 facs. (*The Abraham and Hannah Oppenheim Memorial Publications*, 1). Cincinnati, Hebrew Union College Press, 1931. ISIS

Reviewed by F. PERLES, *OLZ*, 36, 537-38, 1933.

Mowinckel, Sigmund. Eine Studie zur Astrologie des Alten Testaments. *Acta orientalia*, 8, 1-44, 1930. ISIS

Roback, A. A. Curiosities of Yiddish literature. 227 p. Cambridge, Mass., Sci-Art, 1933 ($2). ISIS

This work is not simply a defense of the Yiddish language and literature but a rich encyclopaedia of relevant facts very pleasantly told. Perhaps the most effective brief statement in favor of Yiddish as against Hebrew, is the one forming the beginning of an article by Dr. HUGO BERGMANN, Director of the Hebrew University Library (p. 132): "Our people exists because it possesses its vernacular, Yiddish. It would be foolish to play up Palestine and Hebrew against the Diaspora and Yiddish. Palestine for a long time to come can survive without the Diaspora as little as the Diaspora can in the long run survive without Palestine." This book is almost as interesting to Gentiles as to Jews. I have read it with deep interest; it has cured me of any remnant of anti-Yiddish prejudice. G. S.

Roback, A. A. The euphemism in Yiddish. A study in folk-psychology and philology. *The Jewish Forum*, 4, 736-44, 1921. ISIS

Willis, Bailey. Earthquakes in the Holy Land: a correction. *Nature*, 131, 550, 1933. ISIS

See *Isis*, 20, 580.

13. — IRAN

Przyluski, Jean. La théorie des éléments et les origines de la science. *Scientia*, 54, 1-9, 1933. ISIS

"On aperçoit que la théorie des éléments a des origines religieuses, que, d'une cosmologie mythique fondée sur la triade babylonienne, se sont dégagées la série des trois états de la matière, puis les listes diverses de quatre ou cinq éléments. Il semble que l'Iran soit le foyer d'où ces idées se sont répandues en Grèce, dans l'Inde, en Chine, puis dans tout l'ancien monde. Il apparaît enfin que ces spéculations contenaient en germe les théories préscientifiques sur la constitution, les propriétés et les transformations de la matière."

14. — ISLAM

Andalus, al-. Revista de las escuelas de estudios árabes de Madrid y Granada. Se publica en fascículos semestrales formando cada año un volumen de unas quinientas páginas. Directores: MIGUEL ASÍN PALACIOS y EMILIO GARCÍA GÓMEZ. Redactores: MELCHOR M. ANTUÑA, RAMÓN GARCIA DE LINARES, ÁNGEL GONZÁLEZ PALENCIA, JOSÉ LÓPEZ ORTIZ, NEMESIO MORATA, REGINALDO RUIZ ORSATTI, SALVADOR VILA. Secretario: ÁNGEL GONZÁLEZ PALENCIA. Vol. 1, fasc. 1, 239 p., 1933. Precios de suscripción. España, 25 pesetas

al año. Extranjero, 30 pesetas al año. Redacción: Escuela de estudios árabes, Calle de San Vicente, 60, Pral, Madrid, Administración: Estanislao Maestre, Pozas, 14, Madrid. ISIS

We welcome the publication of this new periodical, organ of the Arabic schools of Madrid and Granada. This first part is analyzed in the present bibliography of *Isis*, and the following ones will be analyzed as they appear. Considering the exceptional merit of the Spanish Arabists, and the treasures of materials available in Spanish libraries and museums, this periodical is bound to be very interesting and very important. The first number is followed by a list of the publications of the Spanish Arabists which is very impressive indeed. Our best wishes to *al-Andalus*! G. S.

Baumstark, A. Das Problem eines vorislamischen christlichkirchlichen Schrifttums in arabischer Sprache. *Islamica*, 4, 562-75, 1931. ISIS

" Die Vermutung, dass die Anfänge eines literarischen Lebens in arabischer Sprache in christlichen Kreisen vorislamischer Zeit zu suchen seien, hat mir grosser Bestimmtheit bereits kein Geringerer als J. WELLHAUSEN ausgesprochen. ' Die Christen haben das Arabische wohl zuerst als Schriftsprache gebraucht. Namentlich die Ibâdier von Hira und Anbar scheinen sich in dieser Richtung Verdienste erworben zu haben.' So lesen wir in seinem klassischen Buche *Reste arabischen Heidentums* (2. Aufl.) S. 222. Insbesondere wird hier alsdann auf die inhaltlich profanen Schöpfungen persönlich sich zum Christentum bekennender Dichter der Jāhilīya hingewiesen, die wegen ihrer Abweichungen ' von klassicher Sprache ' durch ' die Rhapsoden ' nicht überliefert wurden"... " Wenn überhaupt dem Christentum eine Bedeutung für die Erhebung des Arabischen zur Schriftsprache zukommt, so liegt diese Bedeutung in einer anderen Richtung. Dann ist vor allem das älteste Buch in arabischer Sprache nicht der Qoran gewesen, sondern es sind ihm liturgische Bücher eines in arabischer Sprache gefeierten christlichen Kultus vorangegangen. An arabische Evangelienbücher und Psalterien wird man vorab zu denken haben."

Bergsträsser, Gotthelf (gest. 1933). Koranlesung in Kairo. *Der Islam*, 20, 1-42, 1932. ISIS

Blachère, R.; Renaud, H. P. J. Inventaire sommaire des manuscrits arabes acquis par la Bibliothèque générale du protectorat français au Maroc (années 1929-1930). *Hespéris*, vol. 12, 106-33, 1931. ISIS

Bräunlich, E. The well in ancient Arabia. *Islamica*, 1, 41-76, 288-343, 454-517, 1924-25. ISIS

Browne, Edward G. (1862-1926). La médecine arabe (Arabian medicine). Conférences " Fitz-Patrick " faites au Collège des Médecins. Edition française mise à jour et annotée par H. P. J. RENAUD. XII+173 p. (*Bibliothèque de culture et de vulgarisa-*

tion Nord-Africaines, dirigée par E. LÉVI-PROVENÇAL). Paris, LAROSE, 1933 (20 frs.). ISIS

The original text of these very interesting lectures on Arabian medicine (Cambridge, 1921) was reviewed by D. B. MACDONALD (*Isis*, 4, 349-50). It will suffice to mention the existence of this French translation, due to our colleague Dr. RENAUD, one of the leading students of Arabic medicine to-day. I may mention also that the French edition is much cheaper than the English one and that the translator has added a few valuable footnotes. G. S.

Caskel, W. Zur altarabischen Teratologie. *Islamica*, 2, 163-70, 1926. ISIS

Doolittle, Margaret. Lessons in religion and ethics. MACDONALD presentation vol., p. 109-27, Princeton, N. J., 1933. ISIS

" In October 1928 there appeared in the *Moslem World* an article entitled, ' Moslem religious education in Syria.' Among the texts mentioned in that article was one named *Lessons in religion and ethics*, by 'ABD AL-RAḤMĀN MAJDHŪB, printed in Beirût in A. H. 1343. The following is a translation of the first volume of that text, intended for second and third grades in primary schools. The translation is prepared as an example of the material presented to Muslim children, and of the method used in presenting that material."

Ebermann, W. Bericht über die arabischen Studien in Russland während der Jahre 1914-1920. *Islamica*, 3, 229-64, 1927. ISIS

Ebermann, W. Bericht über die arabischen Studien in Russland während der Jahre 1921-1927. *Islamica*, 4, 121-58, 201-48, 1930. ISIS

Farès, Bichr. L'honneur chez les Arabes avant l'Islam. Préface de GAUDEFROY DEMOMBYNES. XIV+226 p. Paris, MAISONNEUVE, 1933. ISIS

Farmer, H. G. Mūsīqī. *Encyclopaedia of Islam*, number 48, 749-55, Leyden, BRILL, 1933. ISIS

Elaborate article on Arabic music by the leading scholar on the subject. G. S.

Finkel, Joshua. Jewish, Christian, and Samaritan influences on Arabia. MACDONALD presentation vol., 147-66, Princeton, N. J., 1933. ISIS

" Not only from the above instance, but from the trend and tenor of the Qur'ān as a whole, it may be seen that MUḤAMMAD (or Arabia) has never regarded Samaritanism as the fountain of Old Testament traditions to be here and there supplemented, if necessity dictated, by those current among the Jews, or vice versa. He drew freely from both sides and gave priority

to neither. To him they were simply two factions of the Yahūd, notwithstanding the fact that the Samaritans would abhor such a label. Of the doctrines and traditions of the Ahl al-Kitāb those were the truest that served his purpose best."... " With him therefore it was not so much a question of rejecting or accepting novel information, as that of being the eloquent expounder of already established traditions."

Grohmann, Adolf. Arabische Eichungsstempel, Glasgewichte und Amulette aus Wiener Sammlungen. *Islamica*, 1, 145-226, 5 pl., 1925. ISIS

Hess, J. J. Die Namen der Himmelsgegenden und Winde bei den Beduinen des inneren Arabiens. *Islamica*, 2, 585-89, 1927. ISIS

Julien, G. H. Pages arabico-madécasses. Histoire, légendes et mythes, Traduction, annotations et commentaires par G. H. JULIEN. 123 p., ill. *Soc. d'édit. géographiques, maritimes et coloniales*, Paris, 1933. ISIS

Krenkow, F. The use of poison by the ancient Arabs. *Islamica*, 4, 596-601, 1931. ISIS

" As far as we can glean from the verses of ancient poets, including the time of the Omayyads, they knew two kinds of poison; the poison of snakes, scorpions etc., and poison administered in food or drink and this latter was largely, if not entirely, derived from plants."... " If poison played a great role we should expect to find some allusions to it in the *Ḥadīth*, but as far as I know there is not the slightest allusion to poisoned weapons anywhere in the canonical books, not even metaphorically."

Laoust, E. Au sujet de la charrue berbère. *Hespéris*, 10, 37-47, 11 fig., 1930. ISIS

Littmann, E. Tausendundeine Nacht in der arabischen Literatur. 37 p. (*Philosophie und Geschichte*, 2). Tübingen, MOHR, 1923. ISIS

Marçais, Georges. La question des images dans l'art musulman. *Byzantion*, 7, 161-83, 1932. ISIS

Margoliouth, D. S.; Holmyard, E. J. Arabic documents from the MONNERET collection. *Islamica*, 4, 249-71, 1930. ISIS

" A parcel of Arabic documents found by M. G. MONNERET in a ruin on the Western bank of the Nile opposite Asuān was sent by their discoverer to Prof. MARGOLIOUTH for decipherment and, if thought desirable, publication. These are all on paper with the exception of one fragment on papyrus and another on gazelle's skin. They proved on examination to be alchemistic prescriptions, charms, dealer's accounts, etc., and private letters. The only

document which bears a date is a receipt for a loan of money, written 27 Dhu'l-Qa'da, 523 or Nov. 11, 1129. Since the literature of magic and alchemy has of late been receiving considerable attention, the publication of a selection from this material seemed justifiable; and the technical knowledge required for the alchemy was kindly supplied by E. J. HOLMYARD, who has devoted much attention to this subject."

Meyerhof, Max. La fin de l'Ecole d'Alexandrie d'après quelques auteurs arabes. *Archeion*, 15, 1-15, 1933. ISIS

Communication faite à l'Institut d'Égypte au Caire, le 9 janvier 1933.

Miller, Barnette. The curriculum of the Palace School of the Turkish sultans. MACDONALD presentation vol., 305-24, Princeton, N. J., 1933. ISIS

This study may be considered as an appendix to the author's book " Beyond the Sublime Porte " (Yale, 1931) reviewed in *Isis*, 17, 439-40. G. S.

Paret, R. Die Geschichte des Islams im Spiegel der arabischen Volksliteratur. 26 p. (*Philosophie und Geschichte*, 13). Tübingen, MOHR, 1927. ISIS

Renaud, H. P. J. L'enseignement des sciences exactes et l'édition d'ouvrages scientifiques au Maroc avant l'occupation européenne. *Archeion*, 13, 325-36, 1931. ISIS

" Ce qui s'est perpétué au Maroc jusqu'aux premières années de ce siècle, ce n'est pas un souvenir atténué de l'époque des grands observateurs, dresseurs de tables, rédacteurs de catalogues d'étoiles, c'est seulement la petite pratique routinière de la science du calcul de l'heure et la construction des instruments servant à cette détermination. Les derniers astrolabes fabriqués à Fès ont rejoint dans la vitrine des collectionneurs les curiosités de l'art indigène. Il nous reste, avec les éditions et les manuscrits que la Bibliothèque du Protectorat a pu acquérir et sauver de la destruction, une collection assez complète pour permettre d'étudier dans le détail, lorsqu'on voudra le faire, la technique des mûqqitîn marocains."

Richter, Gustav. Das Geschichtsbild der arabischen Historiker des Mittelalters. 28 p. (*Philosophie und Geschichte*, 43). Tübingen, MOHR, 1933. ISIS

Sarton, George. Remarks on the study and the teaching of Arabic. MACDONALD presentation vol., p. 331-47, Princeton, N. J., 1933. ISIS

Shellabear, William G. A Malay treatise on popular Sûfî practices. MACDONALD presentation vol., p. 351-70, Princeton, N. J., 1933. ISIS

" The following is the translation of a book printed at Mecca in A.H. 1323, under the title *Fatḥu'l-'ārifīn*. On the title page the statement is made that it has been translated into the Malay language, presumably from the Arabic, and that it explains the bay'ah (covenant with the Shaikh), the dhikr and the silsilah (chain of authorities) of the Qādirīyah and Naqshbandīyah Orders"... " It should perhaps be mentioned that the teachings contained in this Malay book are considered heretical, and have been very severely criticized by certain orthodox Muḥammadans at Mecca, who published at Mecca in A.H. 1325 (A.D. 1907) a Malay book containing three treatises refuting the teachings contained in *Fatḥu'l-'ārifīn*, which had been published two years previously. See my article ' An exposure of counterfeiters,' in *The Moslem World* for October 1930."

Simeika, Morqos pacha. Dalīl al-maṭḥaf al-qubṭī wa ahamm al-kanais wal-adiyirat al-atharya. Al-maṭba'at al-amīryat bi-l-Qahira. 2 vols. 1930-32. ISIS

Arabic description of the Coptic museum, Coptic churches and monasteries, with abundant illustrations . In the second volume homage is paid to A. J. BUTLER, who (it is said) wrote the first book on the subject : *Ancient Coptic churches of Egypt* (2 vols., Oxford 1884). G. S.

Zekī, Sāliḥ. Athār-i-Bāqiya, a history of Arabic mathematics. 2 vols. 512 p. Istanbul, Maṭba'a-i-'Āmira, National Press 1329 (1911) (in Turkish). ISIS

Reviewed by A. ADNAN, *Isis*, 19, 506-15, 1933.

PART III

SYSTEMATIC CLASSIFICATION

I. — SCIENCE IN GENERAL

16. — HISTORY OF SCIENCE

Bologa, Valeriu L. Geschichte der Naturwissenschaften und der Medizin bei den Rumänen. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 371-88, 1933. ISIS

Darmstaedter, Ernst. Einige Bemerkungen zu der Nachprüfung älterer Angaben. *Sudhoffs Archiv für Geschichte der Medizin*, 26, 277-80, 1933. ISIS

Deltheil, Robert. Quelques caractères de l'évolution des sciences depuis un siècle. *Revue scientifique*, 129-34, mars 1933. ISIS

Ginsburg, Benjamin. The value of the history of science. *Archeion*, 15, 27-33, 1933. ISIS

(History of science). Archives of the history of science and technology. 1st issue, VIII+231 p., figs., pl., maps. Leningrad, Academy of Sciences USSR, 1933. (In Russian). Bound, 15 rbl. ISIS

This is the first publication of the Institute of the history of science and technology of the Academy of Sciences (the Institute was founded in 1932, superseding the Commission for the history of knowledge founded in 1921). Some of the papers contained in this issue are mentioned in the present bibliography. The editors promise to add French, German, or English abstracts to the papers which will appear in the third issue; it is, apparently, too late to do the same for the papers of the second issue. A. P.

(History of science, congress, London 1931). Second International Congress. Summaries of various papers. *Archeion*, 14, 497-534, 1932. ISIS

(History of science, congress, Mainz 1932). Bericht über die Verhandlungen der Deutschen Gesellschaft für Geschichte der Medizin, der Naturwissenschaften und der Technik zu Mainz am 23. und 24. September 1932. *Janus*, 37, 161-78, 1933. ISIS

(History of Science Society). Ninth annual report of the corresponding secretary and treasurer of the History of Science Society for the year 1932. *Isis*, 19, 11-12, 1933. ISIS

(Isis). *Isis*' accounts for 1931 and 1932. *Isis*, 19, 13-14, 1933. ISIS

Metzger, Hélène. L'historien des sciences doit-il se faire le contemporain des savants dont il parle? *Archeion*, 15, 34-44, 1933. ISIS

(Paris). Institut d'histoire des sciences de l'Université de Paris. Séminaire d'histoire et philosophie des sciences. Année 1932-1933. *Isis*, 19, 503, 1933. ISIS

Perrier, G. Séance publique annuelle des cinq Académies de l'Institut de France, le mardi 25 octobre 1932. L'Académie des Sciences, le Bureau des Longitudes et les grandes missions scientifiques. Annuaire du Bureau des Longitudes pour l'an 1933, notice C, 20 p., Paris, 1933. ISIS

Histoire de 1672 (Richer) à 1932.

Rainov, T. I. Important foreign periodicals devoted to the history

of science. *Sorena*, vol. 3, no. 2, 129-43, Moscow, 1933 (In Russian). ISIS

Chapter titles: Organization of the study of the history of science; Science in Antiquity; Science of feudal Europe; Science of the XVI-XVIII centuries (early capitalism). RAINOV reviews several papers which appeared in recent issues of *Isis*, *Archeion*, and other periodicals. A. P.

Sarton, George. Introduction to the history of science. Vol. II: From the time of RABBI BEN EZRA to ROGER BACON. In two parts. XXXV+1251 p. Baltimore, WILLIAMS AND WILKINS, 1931. ISIS

Reviewed by A. G. P., *al-Andalus*, 1, 214-16, 1933; by E. J. DIJKSTERHUIS, *Euclides*, 9, 29, 1932/33; by MIRCEA ELIADE, *Cuvântul* (Bucuresti, 12 August 1933); by MIRCEA ELIADE, *Vremea* (An. 6, no. 287, 14 Mai 1933, Bucuresti; in Rumanian); by E. J. HOLMYARD, *History* (18, 43-45, London, 1933); by E. J. HOLMYARD, *Journal of the Royal Asiatic Society*, 458-60, 1933; by Q. VETTER, *Stredni škola*, 30, 155; by Q. VETTER, *Casopis pro pěstování matematiky a fysiky*, 62, 258; by E. ZINNER, *DLZ*, 4, 1287-92, 1933.

Sarton, George. Preface to the nineteenth volume of *Isis*. *Isis*, 19, 6-10, 1933. ISIS

Brief statement of the work done thus far and its many short-comings. Reminiscences of the author's stay in Fez, Morocco. G. S.

Sarton, George. Second preface to the nineteenth volume of *Isis* (Beirût). *Isis*, 19, 322-29, 1933. ISIS

Sarton, George. Section of the History of science of the Carnegie Institution. Fourteenth annual report for the period extending from July 1, 1931 to June 30, 1932 (previous reports appeared in Year Books Nos. 18-30; the twelfth and thirteenth also in *Isis*, 15, 170-71, and 17, 209-17, respectively). *Isis*, 19, 15-18, 1933. ISIS

Sarton, George; Pogo, Alexander. Thirty-fifth critical bibliography of the history and philosophy of science and of the history of civilization (to August 1932). *Isis*, 19, 253-320, 1933. ISIS

This thirty-fifth critical bibliography contains about 350 items contributed by 18 scholars of four countries.

Sarton, George; Pogo, Alexander. Thirty-sixth critical bibliography of the history and philosophy of science and of the history of civilization (to October 1932). *Isis*, 19, 379-470, 1933. ISIS

675 items contributed by 13 scholars.

Sarton, George. Thirty-seventh critical bibliography of the history

and philosophy of science and of the history of civilization (to December 1932). *Isis*, 19, 521-619, 1933. ISIS

590 items contributed by 9 scholars.

Tannery, Paul (1843-1904). Mémoires scientifiques publiés par J. L. HEIBERG et H. G. ZEUTHEN. Vol. XI. Comptes rendus et analyses, 1877-1904. XX+644 p. Toulouse, PRIVAT, 1931. ISIS

Reviewed by GEORGE SARTON, *Isis*, 19, 515-16, 1933.

Vetter, Q. L'évolution des sciences sur le territoire de la République Tchécoslovaque. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 333-52, 1933. ISIS

Williams, W. Roger. Science and its history. 19 p. London, BURROW, 1933. ISIS

17. — ORGANIZATION OF SCIENCE

(Internal organization is meant, see Isis, 1, 195. *For external organization, national or international, see section 55)*

Adams, Mary. Science in the changing world, by THOMAS HOLLAND, H. LEVY, JULIAN HUXLEY, JOHN R. BAKER, BERTRAND RUSSELL, ALDOUS HUXLEY, HUGH I'A. FAUSSET, HILAIRE BELLOC, J. B. S. HALDANE, OLIVER LODGE. 286 p. New York, Century, 1932 ($2.00). ISIS

This is a series of radio talks for adult education of the British Broadcasting Corporation. LEVY defines science; HUXLEY and BAKER relate man to his environment, link him to his ancestry, discuss his origin and development, the evolution of mind, and the significance of art and religion. RUSSELL plans an organized scientific society, and ALDOUS HUXLEY suggests humanists should administer it. FAUSSET demurs and asserts that a civilized society can only be created by men and women who are experts in the art and understanding of life. BELLOC rallies to the support of individual freedom in the machine age, but HALDANE would secure liberty through regulation based on knowledge of the individual. LODGE closes the symposium with a tribute to science which widens the outlook of man upon the universe. Reviewed by F. S. MARVIN, *Nature*, 131, 674-75, 1933. C. A. K.

(American Council of Learned Societies). Annual meeting of the American Council of Learned Societies, January 29, 30, 1932 (Summary of proceedings). *Isis*, 19, 195-97, 1933. ISIS

Ford, Guy Stanton. Science and civilization. 29 p. *(The day and hour series of the University of Minnesota)*. Minneapolis, University of Minnesota Press, 1933. ISIS

Garbedian, H. Gordon. Major mysteries of science. 355 p., 64 pl. New York, CORVICI, FRIEDE, 1933 ($3.75). ISIS

This is a carefully selected popular account of the current status of scientific discovery and hypothesis in the major fields of chemistry, physics, biology, geology, cosmology, and astronomy, with brief historical data. C. A. K.

18. — PHILOSOPHY OF SCIENCE

Bachelard, Gaston. Les intuitions atomistiques (Essai de classification). 164 p. Paris, BOIVIN, 1932. ISIS

Par une analyse fouillée de la complexité des doctrines atomistiques, BACHELARD est conduit à une classification qui lui fait distinguer : l'atomisme réaliste, l'atomisme positiviste, l'atomisme criticiste et l'atomisme axiomatique, celui-ci évidemment de pensée essentiellement moderne. Pour les travaux antérieurs de philosophie scientifique et d'histoire des sciences de BACHELARD, voir *Isis*, 11, 522; 12, 415; 19, 233-35. L. G.

Burke, John Butler. The emergence of life. Being a treatise on mathematical philosophy and symbolic logic by which a new theory of space and time is evolved. VIII+396 p. Oxford, University Press, 1931. ISIS

Reviewed by H. T. DAVIS, *Isis*, 19, 214-17, 1933.

Einstein, Albert. On the method of theoretical physics. 20 p. (The Herbert Spencer lecture delivered at Oxford, 10 June, 1933). New York, Oxford University Press, 1933. (50 cts.) ISIS

" The conception here outlined of the purely fictitious character of the basic principles of theory was in the eighteenth and nineteenth centuries still far from being the prevailing one. But it continues to gain more and more ground because of the everwidening logical gap between the basic concepts and laws on the one side and the consequences to be correlated with our experiences on the other—a gap which widens progressively with the developing unification of the logical structure, that is with the reduction in the number of the logically independent conceptual elements required for the basis of the whole system." (p. 11). " It is essential for our point of view that we can arrive at these constructions and the laws relating them one with another by adhering to the principle of searching for the mathematically simplest concepts and connexions of them. In the paucity of the mathematically existent simple field-types and of the relations between them, lies the justification for the theorist's hope that he may comprehend reality in its depths." (p. 17).

Flexner, Abraham. The burden of humanism. 25 p. (The Taylorian lecture, 1928). Oxford, Clarendon Press, 1928. ISIS

" I propose to consider to-day the peculiar burden laid upon humanism by developments that are non-humanistic in their essential character. It is the merest truism to say that the outstanding features of modern life are

science, industry, and democracy. Obviously, within the limits of a lecture I cannot discuss all three. I shall discuss science and humanism somewhat fully, industry and humanism briefly; democracy and humanism I cannot touch at all."

Henri, Victor. Matière et énergie. 436 p. ill. Paris, HERMANN, 1933. ISIS

Exposé systématique de l'ensemble des faits relatifs à nos connaissances actuelles sur la structure de la matière, appuyé sur l'idée directrice que la matière et l'énergie constituent un tout inséparable, pouvant se transformer mutuellement l'une dans l'autre. Table : I. Discontinuité de la matière. Détermination du nombre des molécules; II. Les éléments chimiques; III. Propriété fondamentale commune à tous les éléments. Spectre des rayons Roentgen. Nombre d'électrons et nombre atomique; IV. Système périodique des éléments; V. Éléments radioactifs; VI. Les isotopes; VII. Désintégration et synthèse des éléments; VIII. Propriétés spatiales des éléments; IX. Théorie cinétique des gaz; X. Structure des atomes. L. G.

Meyerson, Emile. Réel et déterminisme dans la physique quantique. 50 p. (Exposés de philosophie des sciences, publiés sous la direction de LOUIS DE BROGLIE, I). Paris, HERMANN, 1933. ISIS

Peirce, Charles Sanders. The collected papers of CHARLES SANDERS PEIRCE. Edited by CHARLES HARTSHORNE and PAUL WEISS. Vol. 1. Principles of philosophy. Cambridge, Harvard University Press, 1931. ISIS

Reviewed by H. T. DAVIS, *Isis*, 19, 217-20, 1933.

Périéteanu, Alexandre. La méthode scientifique. 204 p. *Biblioth. de philosophie contemporaine*. Paris, ALCAN, 1932. ISIS

Voici résolu, une fois de plus, par une " analyse de la méthode scientifique " (pp. 1-70), et des exemples d' " application de la méthode scientifique " (71-201), le problème central de la philosophie. L'auteur pense d'ailleurs qu'il n'est pas résolu une fois de plus, mais qu'il l'est pour la première fois : ne nous dit-il pas (p. 72) " l'étude de la méthode scientifique n'a jamais été entreprise avec méthode." Toutefois, dès les premières lignes de l'ouvrage, certains lecteurs se cabreront devant cette affirmation : " connaître, c'est sentir, et les sens sont les mêmes pour tous." D'autres auront la même réaction un peu plus loin en lisant ceci : " S'il était vrai que je pense donc je suis, il s'ensuivrait que tout ce qui ne pense pas n'existe pas." (p. 17). Les physiologues apprendront cependant que " les dimensions de nos sensations " peuvent être groupées en trois classes. Les mathématiciens sauront qu'ils se sont engagés dans une voie fausse, et qu' " ils admettent sans savoir pourquoi qu'un néant n'est ni plus grand ni plus petit qu'un autre, mais que trois est plus grand que deux, probablement parceque le groupe de cinq lettres dont est composé le mot trois est plus grand que le groupe de quatre lettres dont est composé le mot deux" (p. 81). Heureusement, tout le monde souscrira

à cette affirmation qui clôt le livre : " Notre savoir est immense si nous le rapportons à nos moyens d'observation. Il est minuscule si nous le rapportons à l'objet de l'étude." L. G.

Perrin, Jean. La recherche scientifique. Atomistique. 24 p. Paris, HERMANN, 1933. ISIS

Planck, Max. Die Kausalität in Naturgeschehen. *Scientia*, 53, 153-64, 1933 ; trad. française, *ibid.*, supplément, 52-62. ISIS

" La loi de causalité n'est ni vraie ni fausse : elle constitue plutôt un principe heuristique, un guide et, à mon avis, le plus précieux que nous possédions, qui nous permet de nous orienter dans le labyrinthe des événements et nous indique la direction que doit suivre la recherche scientifique, pour arriver à des résultats féconds."

Planck, Max. Wege zur physikalischen Erkenntnis. 280 p. Leipzig, HIRZEL, 1933. ISIS

Planck, Max. Where is science going? Prologue by ALBERT EINSTEIN. Translation and biographical note by JAMES MURPHY. 222 p. New York, NORTON, 1932. ISIS

Reviewed by CASSIUS JACKSON KEYSER, *Scripta mathematica*, 1, 327-41, 1933.

Poulton, E. B. et al. HUXLEY memorial lectures, 1925-1932. 172 p. London, MACMILLAN, 1933 ($1.10). ISIS

This book contains seven annual lectures given at the Imperial College of Science and Technology in London, beginning with 1925, the centenary of the birth of THOMAS HENRY HUXLEY. The lectures have been printed singly in *Nature* or as pamphlets, and have been collected here to make them more accessible.

The first lecture, by E. B. POULTON, is reminiscent of HUXLEY's defense of the validity of the scientific method and the social significance of scientific thought. The second, by P. C. MITCHELL, on *Logic and law in biology*, is a defense of mechanism and a review of the logic of HUXLEY's *Presidential address before the British Association in* 1870. The third, by G. ELLIOT SMITH, on *Conversion in science*, traces the steps by which HUXLEY, HOOKER, and LYELL came to support DARWIN's Natural selection and is a defense of the transmission of human culture as against indigenous origins. The fourth, by F. O. BOWER, is a review and extension of his *Origin of a land flora* (1908), based on the alternation of generations. The fifth, on *Physical and social science*, by GRAHAM WALLAS, discusses higher education in the social sciences and the academic rewards therefor. The sixth, by Sir A. S. WOODWARD, is a review of modern progress in vertebrate palaeontology, including the bases of dating remains of primitive man. The seventh, by ALDOUS HUXLEY, on *T. H. Huxley as a man of letters*, is a critical discussion of HUXLEY's style and of scientific literary writing. C. A. K.

Russell, Bertrand. Essais sceptiques. Trad. par ANDRÉ BERNARD. 356 p. Paris, RIEDER, 1933. ISIS

BERTRAND RUSSELL n'est point seulement le logicien de la *Méthode scientifique en philosophie* (*Isis*, 3, 311-14; 13, 227), de l'*Introduction à la philosophie mathématique* (*Isis*, 4, 199; 7, 313; 13, 542), de l'*Analyse de l'esprit* (*Isis*, 4, 369; 15, 477), de *The analysis of matter* (*Isis*, 11, 235), de *Un aperçu de la philosophie* (*Isis*, 11, 557), de *Principia mathematica* (avec A. N. WHITEHEAD : 8, 226-31; 10, 513-19), d'un *ABC de relativité* (9, 570) etc. On peut dire que tout ce qui est humain l'intéresse. Témoins : *The problem of China* (5, 529), *Principles of social reconstruction, Marriage and morals*, et ses *Sceptical essays* (13, 574), dont voici, avec quatre ans de retard, une traduction française. Pour RUSSELL, le scepticisme est une valeur; lui seul permet de ne pas " admettre une proposition quand il n'y a aucune raison de supposer qu'elle est vraie." Et RUSSELL qui n'a pas hésité pendant la guerre à être un objecteur de conscience — et il y fallait un certain courage — déclare la guerre aux mensonges, aux hypocrisies, aux superstitions. Certains titres de chapitres sont à eux seuls suggestifs : la Science peut-elle être superstitieuse; le mal que font les " hommes de bien"; la liberté contre l'autorité dans l'éducation.

L. G.

II. — FORMAL SCIENCES
(Knowledge of forms)

19. — LOGIC AND THEORY OF KNOWLEDGE

Greenwood, Thomas. L'avenir de la logique russellienne. *R. de métaphysique et de morale*, 40, 363-78, 1933. ISIS

Pastori, Carlo. Il problema gnoseologico e i problemi limite della conoscenza. 27 p. Massa, MEDICI, 1932. ISIS

Peirce, Charles Sanders. Collected papers of CHARLES SANDERS PEIRCE. Volume II : Elements of logic. Edited by CHARLES HARTSHORNE and PAUL WEISS. Cambridge, Harvard University Press, 1932. ISIS

Reviewed by W. V. QUINE, *Isis*, 19, 220-29, 1933.

Reymond, Arnold. Les principes de la logique et la critique contemporaine. XII+280 p. Paris, BOIVIN, 1932. ISIS

Développement d'une série de leçons faites à la Sorbonne sur la logique algorithmique et les problèmes qu'elle soulève. Après un bref aperçu historique (19 p.), l'auteur examine le problème de la vérité et le caractère normatif de la logique, la logique formelle, et son indépendance vis-à-vis du pragmatisme (W. JAMES, F. C. SCHILLER), du sociologisme (E. DURKHEIM, L. LÉVY-BRUHL), du néothomisme (J. MARITAIN); la logistique et le calcul logique (R. FEYS, B. RUSSELL et A. N. WHITEHEAD.

W. E. JOHNSON, L. COUTURAT, L. WITTGENSTEIN, R. CARNAP); le principe du tiers exclu et la vérification mathématique (L. E. J. BROUWER); la logique et les mathématiques (B. RUSSELL); l'axiomatique et la démonstration mathématiques (M. PASCH, D. HILBERT, J. HERBRAND). L. G.

20. — MATHEMATICS

Archibald, R. C. Italian mathematical periodicals. *Scripta mathematica*, 1, 275, 1933. ISIS

Archibald, R. C. Poems about mathematicians. *Scripta mathematica*, 1, 364, 1933. ISIS

Baekelmans, Willem. Het cyfer *seven*. Antwerpen, 1917. ISIS

Liste très riche mais insuffisamment critique des interventions du nombre 7 dans l'histoire, le folklore, la littérature etc. de tous les temps et de tous les pays. J. P.

Bowes, Julian. Dynamic symmetry. *Scripta mathematica*, 1, 236-45, 5 fig., 3 facs., 309-14, 1 pl., 1933. ISIS

Breidenbach, W. Die Dreiteilung des Winkels. IV+38 p., 43 fig. (*Math.-Phys. Bibl.*, 78). Leipzig, TEUBNER, 1933. ISIS

In diesem Buche wird gezeigt, dass eine Dreiteilung eines beliebigen Winkels nur mit Zirkel und Lineal exakt nicht durchführbar ist, dass dagegen, wenn man auch andere Hilfsmittel zulässt, eine Lösung des Problemes möglich ist.

De Vleeschauwer, H. J. Uit de eerste dagen der niet-Euclidische meetkunde. *Wis- en Natuurkundig. Tijdschrift*, 6, 215-22, 1933. ISIS

Dijksterhuis, E. J. De Versiera. *Euclides*, 9, 233-65, 18 fig., 1932-33. ISIS

Fraenkel, Adolf. On modern problems in the foundations of mathematics. *Scripta mathematica*, 1, 222-27, 1933. ISIS

"To this day mathematics has not recovered from the sudden shock its structure suffered toward the close of the last century: at present, more than ever, the after-effects of this concussion assert themselves in an enormous inflation of the literature on the foundations of mathematics and, more generally, on the border-domain lying between mathematics and philosophy. New problems have emerged here and new paths are being blazed."

Ginsburg, J. Spanish symbol for "thousand." *Scripta mathematica*, 1, 264-65, 1933. ISIS

Gliozzi, Mario. Precursori del sistema metrico decimale. *Atti della Reale Accademia delle Scienze di Torino*, 67, 29-50, 1932. ISIS

I heard of this paper only when my second STEVIN paper (now printing) was already completed. However, I was able to add a note and a new section (104 bis) referring to it. The author summarizes his argument as follows: "Il problema d'un sistema internazionale di misure fu ampiamente discusso dagli scienziati del XVII secolo. Per ciò che si riferisce a quest'argomento, si espongono i lavori di STEVIN, MERSENNE, RICCIOLI, HUYGENS, WREN, HOOKE, MORAY, MOUTON, BURATTINI. Si ricorda, in particolare, che la parola *metro*, nel senso specifico moderno, fu introdotta da TITO LIVIO BURATTINI." According to GLIOZZI: the first efforts to determine the length of the seconds pendulum were made by GIOVAN BATTISTA RICCIOLI in 1642 and by MERSENNE in 1644; the first public suggestions to use the seconds pendulum as a universal standard were made in the *History of the Royal Society* of THOMAS SPRAT, who referred to WREN. The author's account of BURATTINI (c. 1615-c. 1682) is derived from FAVARO's papers of 1896 and from the *Misura universale* (Vilna 1675) as reprinted in Cracow 1897. G. S.

Keyser, Cassius Jackson. Mathematics as a culture clue. *Scripta mathematica*, 1, 185-203, 1933. ISIS

Lasswitz, Kurd (Breslau 1848-Gotha 1910). Die Welt und der Mathematikus. Ausgewählte Dichtungen von KURD LASSWITZ. Herausgegeben von W. LIETZMANN. 91 p. Leipzig, ELISCHER. (s.a.) ISIS

LASSWITZ is best known by his history of atomism (2 vols. 1890), but he was also a "poet"—an inventor of fictions—and he has sometimes been called the German JULES VERNE. His best known book in that line is the novel entitled "Auf zwei Planeten." The present volume contains a selection of his fancies, for the special pleasure of mathematicians. For example, the last one entitled "Prost. Der Faust-Tragödie (-n)ter Teil" bears the following subtitle "Von Herrn von GOETHE, Exzellenz, durch astrophysische Vermittlung aus der vierten Dimension in ein von allen Seiten verklebtes Buch eigenhändig aufgezeichnet. Im spirituösen Auftrage des Mathematischen Vereins zu Breslau aufgeschnitten und herausgegeben von Dr. KURD LASSWITZ." G. S.

Lattin, Harriet Pratt. The origin of our present system of notation according to the theories of NICHOLAS BUBNOV. *Isis*, 19, 181-94, 1933. ISIS

"The work and theories of NICHOLAS BUBNOV, Russian historian of mathematics, are often referred to, but the knowledge of them is so incomplete due to their inaccessibility that a brief exposition of them may be of interest. BUBNOV denies the Hindu origin of our present numerals, contending that the fundamental elements of our present system were known in classical antiquity, and that our debt is to the Greeks, not the Hindus."

Loria, Gino. Considerazioni e notizie intorno alla storia delle mate-

matiche. *Accad. Lincei, Cl. d. sci. fis. matem. e nat., Rendiconti,* 17, 768-75, 1933. ISIS

Survey of recent publications dealing with various phases of the history of mathematics from the earliest times to the present. R. C. A.

Loria, Gino. Mathematics and law. *Scripta mathematica,* 1, 276, 1933. ISIS

Loria, Gino. Il passato e il presente delle principali teorie geometriche. Storie e bibliografia. Quarta edizione totalmente rifatta. XXIII+ 467 p. Padua, Cedam, 1931. ISIS

Reviewed by R. C. ARCHIBALD, *Isis,* 19, 229-31, 1933.

Loria, Gino. Storia delle matematiche. Volume 2. I secoli XVI e XVII. 595 p. Turin, STEN, 1931. ISIS

Reviewed by R. C. ARCHIBALD, *Isis,* 19, 231, 1933.

Luria, S. J. The problem of Egyptian influence on Greek geometry. *Archives of the hist. of science and technology,* 1, 45-70, 12 fig., 1933 (In Russian). ISIS

Mordukhai-Boltovskoi, Dimitri. Genese und Geschichte der Limestheorie. *Archeion,* 15, 45-72, 1933. ISIS

Contents: 1. Das Problem der Intensierung der Formen; 2. Der Embryo der Idee der Funktion; 3. LEIBNIZ und NEWTON; 4. BERTRAND und KÄSTNER; 5. D'ALEMBERT und DE LA CHAPELLE; 6. L'HUILLIER und SIMPSON; 7. LACROIX und GURIEW; 8. Die Logisierung der Idee der Grenze; 9. Der Ordnungscharakter des Limes; 10. Das italienische Lehrbuch.

Mordukhai-Boltovskoy, Dimitri. The concept of infinity. Historical and critical notes. *Scripta mathematica,* 1, 132-34, 252-53, 1933. ISIS

Segre, Beniamino. La geometria in Italia, dal CREMONA ai giorni nostri. *Ann. mat. pura appl.,* 11, 1-16, 1932. ISIS

Sergescu, P. Histoire des sciences mathématiques et physiques en Roumanie. *Bulletin of the international committee of historical sciences,* 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 319-32, 1933. ISIS

Simons, Lao Genevra. Two reckoning tables. *Scripta mathematica,* 1, 305-08, 3 fig., 1933. ISIS

But few reckoning tables have come down to us. In his book of 1916 FRANCIS P. BARNARD said "The tables at Basle [three], the doubtful one

at Nuremberg, and the reckoning cloths [five] at Munich, are all that I have been able after considerable search and inquiry so far to discover in continental museums, while in this country [England] apparently there are none." (p. 231). The author has found two more tables in the Landesmuseum of Zurich, the one of the sixteenth century, and the other of the seventeenth century; both are described. G. S.

Smith, David Eugene. Early American mathematical periodicals. *Scripta mathematica*, 1, 277-85, 4 facs., 1933. ISIS

Struik, D. J. Outline of a history of differential geometry. *Isis*, 19, 92-120, 1933. ISIS

Summary of ten lectures given at the Massachusetts Institute of Technology, 1931-32. Contents: 1. The time before LEIBNIZ; 2. The first systematic contributions; 3. The eighteenth century; 4. MONGE and the École Polytechnique; 5. MONGE's pupils.

Sullivan, John William N. Mathematics and culture. *Mathematical Gazette*, 16, 243-53, 1932. ISIS

Szücs, Adolphe. L'histoire des mathématiques en Hongrie. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 284-91, 1933. ISIS

Tropfke, Johannes. Geschichte der Elementar-Mathematik in systematischer Darstellung mit besonderer Berücksichtigung der Fachwörter. Zweiter Band, Allgemeine Arithmetik. Dritte, verbesserte und vermehrte Auflage, Berlin and Leipzig, 1933, 4+266 pages. ISIS

TROPFKE's *Geschichte der Elementar-Mathematik* has become one of the indispensable works of reference in its field, because of the extraordinary care which has been taken to give exact references to authorities for almost every statement. The first edition of the work appeared thirty years ago in two volumes (1902-03, 8+332+8+496 p.). The second edition of 1921-24 was in seven volumes, (totalling about 1300 pages). In 1930 appeared the first volume of the third edition, again much increased in size over the corresponding volume of the second edition, and the same may be said for the volume now under review (formerly, 4+221 p.). This increase in the size of volume 2 has been brought about, not only through revision of the text, but also through multiplication of the footnote references to authorities, now 1461, as compared with 1157 of the second edition; a table, (p. 264-266) gives the corresponding numbers of these footnotes in the last two editions. The changes in the text are evident on almost every page, and the work can not be praised too highly. The regretted WIELEITNER was a powerful coöperator in bringing his friend's work to this high plane. Doctor TROPFKE is now retired from his position as Oberstudiendirektor

at the Kirschner Schule in Berlin and is ready to prepare for the press the manuscript for the other five volumes of the third edition; but under present economic conditions publishers are loath to embark on new expenditures. That some way may be found to continue the publication of the new edition of this very notable work, must be the earnest hope of a large number of mathematicians, and of others interested in the history of science.

R. C. A.

Wavre, R. Mathématique et philosophie. *Arch. de la Société belge de philosophie*, 5, 3-16, 1933. ISIS

Whitrow, G. J. The importance of the history of mathematics in relation to the study of mathematical technique. *Mathematical Gazette*, 16, 225-27, 1932. ISIS

Windred, G. The history of mathematical time. *Isis*, 19, 121-53, 1933. ISIS

" The problem of Time is one of the most difficult and elusive in the entire domain of natural philosophy. It has occupied the attention of philosophers in every branch of learning since the dawn of thought. References to the problem, in one or other of its many forms, are to be found in the philosophical writings which have come down to us from the earliest civilisations."... " An historical study of the subject of Mathematical Time, as employed in modern science, reveals much of interest and value, not only to the mathematician, but also to the philosopher, with whom the mathematician becomes closely related in his quest for knowledge concerning the ultimate nature of existence. In the following essay we endeavour to trace the birth and subsequent evolution of the concept of Mathematical Time." 1. Origin and meaning of Mathematical Time; 2. Theoria temporis mathematicae of ISAAC BARROW; 3. The contemporaries and followers of Sir ISAAC NEWTON; 4. The nineteenth century; mathematical theories of M. BUÉE, and Sir WILLIAM ROWAN HAMILTON.

Wren, F. L.; Garrett, J. A. The development of the fundamental concepts of infinitesimal analysis. *American Mathematical Monthly*, 40, 269-81, 1933. ISIS

III. — PHYSICAL SCIENCES
(Knowledge of inorganic nature)

22. — MECHANICS
(Including celestial and atomical mechanics)

Bauer, E. Critique des notions d'éther, d'espace et de temps. Cinématique de la relativité. 32 p. Paris, HERMANN, 1932. ISIS

Nous avons signalé (*Isis*, 19) que la Deuxième Semaine de Synthèse tenue

à Paris au Centre international de synthèse, avait entendu une série d'exposés et de discussions sur la relativité, dirigées par PAUL LANGEVIN. Ces exposés et les discussions qui les ont suivis viennent de paraître en librairie. Outre l'exposé de BAUER, ici signalé, qui ouvrait la série, on trouvera ci-après indication bibliographique de ceux de F. PERRIN, L. DE BROGLIE, G. DARMOIS, E. CARTAN, et la conclusion générale de LANGEVIN. L. G.

Brillouin, Léon. Notions de mécanique quantique ; les méthodes d'approximation. 36 p. Paris, HERMANN, 1932. ISIS

Constitue le fasc. I d'une série d'exposés sur la théorie des *quanta*, publiés sous la direction de LÉON BRILLOUIN. L. G.

Broglie, Louis de. Conséquences de la relativité dans le développement de la mécanique ondulatoire. 14 p. Paris, HERMANN, 1932. ISIS

Darmois, G. La théorie einsteinienne de la gravitation ; les vérifications expérimentales. 30 p. Paris, HERMANN, 1932. ISIS

Einstein, Albert. Les fondements de la théorie de la relativité générale. Théorie unitaire de la gravitation et de l'électricité. Structure cosmologique de l'espace. Trad. par MAURICE SOLOVINE. 112 p. ill. Paris, HERMANN, 1933. ISIS

Le premier de ces mémoires (*Annalen der Physik*, 1916) est l'exposé de la théorie de la relativité générale. Le second, auquel a collaboré W. MAYER, a été présenté à l'Académie des sciences de Berlin le 22 octobre 1931. Le dernier est traduit sur le manuscrit rédigé par EINSTEIN en septembre 1932. Le volume est orné d'un très beau portrait d'EINSTEIN. L. G.

Langevin, Paul. La relativité. 18 p. Paris, HERMANN, 1932. ISIS

Perrin, Francis. La dynamique relativiste et l'inertie de l'énergie. 20 p. Paris, HERMANN, 1932. ISIS

Rainov, T. I. Zur Geschichte des Aufbaues einer " Mechanik ohne Kraefte." *Sorena*, vol. 3, no. 1, 57-80, Moscow, 1933. (In Russian). ISIS

23. — ASTRONOMY

Altfeld, E. Altgermanische Astronomie? Eine Kritik der astronomischen Entdeckungen WILHELM TEUDTS. *Niedersächs. Jb. Landesgeschichte*, 8, (*Nachrichten aus Niedersachsens Urgeschichte*, Nr. 5), 30-58, 1931. ISIS

Bigourdan, M. G. Le Bureau des longitudes. Chap. IV. Demandes

diverses du bureau. Présentation laborieuse de candidats et vote des adjoints. Lettre de DELAUNAY. Elections de TESSAN, de LAMÉ. La réforme de 1862. *Annuaire du Bureau des Longitudes* pour l'an 1933, notice A, 91 p. Paris, 1933. ISIS

Heavens, The. Astronomical journal published in Japanese. I have seen no. 123 of vol. XI, July 1931, and no. 142 of vol. XIII, Feb. 1933. ISIS

For no. 123 see note on HOTTA, MASATAMI. No. 142 contains the following historical papers : ISSEI YAMAMOTO & KANAME NAKAMURA, *Astronomical researches of Nootoo Kunitomo*. KANAME NAKAMURA, *Gregorian reflectors now existing in Japan*. EITARO DATE, *Iwahasi-Zenbei's telescopes of 140 years ago;* SUSUMU IMOTO, *The pioneer of telescope-makers in Japan.* G. S.

Menon, C. P. S. Early astronomy and cosmology : a reconstruction of the earliest cosmic system. 192 p. (History of science library, ed. by A. WOLF). London, ALLEN & UNWIN, 1932. ISIS

Reviewed by E. G. R. TAYLOR, *Geographical Journal*, 80, 546, 1932. A suggested explanation of a common origin of the four quarters, the twelve houses and the sexagesimal division of the circle, from bordered squares; supported by evidence from Babylonian, Hindu and Chinese astronomy. C. W. A.

Mineur, Henri. L'univers en expansion. Exposés de physique théorique, publiés sous la direction de LOUIS DE BROGLIE, VIII. 42 p., ill. Paris, HERMANN, 1933. ISIS

Nous sommes redevables du concept de l'univers en expansion (G. LEMAÎTRE, 1925-27), pour moitié à la théorie d'EINSTEIN, et pour moitié à l'observation de la récession des spirales faites par E. P. HUBBLE à l'observatoire de Mount Wilson. L. G.

Tass, Anton. Die Sternkunde in Ungarn. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 298-311, 1933. ISIS

Zinner, E. Der Mensch und die Sterne. *Fortschritte der Medizin*, 51, 22 p., 1933. ISIS

24. — PHYSICS

Barbour, J. Murray. The persistence of the Pythagorean tuning system. *Scripta mathematica*, 1, 286-304, 1933. ISIS

" The first part of the article contains a brief history of tuning theories, with interpolated expository material. Then comes a section devoted to the ancient doctrine that the comma is the common measure of musical intervals, and to the resurgence of this doctrine in modern forms of multiple

division. After a cursory glance at several earlier mathematical accounts of the Pythagorean tuning, a more lengthy discussion is accorded CARAMUEL and his musical logarithms, with an excursion into other methods of logarithmic representation. The more important modifications of the Pythagorean system are next presented, as well as the names of some strict Pythagoreans of modern times. In conclusion, the present existence of the Pythagorean tuning is considered in relation to the tuning of stringed instruments, introspective concepts of pitches, and theories of harmony."

Pogány, Bela. Le développement de la physique en Hongrie. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 292-97, 1933. ISIS

Policard, A. La merveilleuse histoire du microscope. *Revue de l'Université de Lyon*, 3, 203-31, 1932. ISIS

Roshdestvenski, D. Evolution of ideas concerning the structure of atoms and molecules. *Archives of the history of science and technology*, 1, 1-20, 1933. (In Russian). ISIS

25. — CHEMISTRY, PHYSICO-CHEMISTRY, INDUSTRIAL CHEMISTRY

Bachelard, Gaston. Le pluralisme cohérent de la chimie moderne. 235 p. Paris, VRIN, 1932. ISIS

Reviewed by H. METZGER, *Isis*, 19, 233-35, 1933.

Dubrisay, René. Le développement historique de la chimie des métaux et de ses applications. *Revue scientifique*, 1-3, janvier 1933. ISIS

Hauben, Saul S. The derivations of the names of the elements. *Jour. Chem. Education*, 10, 227-34, 1933. ISIS

Lippmann, Edmund O. von. Kleine Beiträge zur Geschichte der Chemie. *Chemiker-Zeitung*, 57, 433, 1933. ISIS

Contents : 1. Zur Geschichte des Alkohols; 2. Der Essig des HANNIBAL; 3. Künstliche Perlen und Edelsteine; 4. Chinesischer Ursprung der Alchemie.

Menshutkin, B. N. The most important milestones in the development of chemistry during the last one hundred and fifty years. (In Russian). 116 p. Academy of Sciences of USSR, Leningrad, 1932. ISIS

An excellent and compact survey of the development of modern chemical science. In order to bring out its continuous growth and logical development, the author devotes considerable space to an account of the genesis of its underlying concepts. T. L. D.

Thompson, C. J. S. The lure and romance of alchemy. 249 p. (The simple guide series). London, HARRAP, 1932. ISIS

This is a fine popularization of the early history of chemistry; readable, attractive, and interesting, but at the same time scholarly and accurate. It compares with certain other recent attempts in the same direction as the *London Times* compares with a New York tabloid. The author nowhere sacrifices the truth in an effort to be sensational. He seems to be well acquainted with the latest advances in the study of the history of chemistry. His book contains some material which has not heretofore been included in works on that subject, and much valuable matter which is not ordinarily included in popular works on alchemy. The book is well indexed, beautifully illustrated, and very moderately priced at five shillings net. Reviewed by E. J. HOLMYARD, *Nature*, 132, 152-53, 1933. T. L. D.

Weeks, Mary Elvira. The discovery of the elements. Collected reprints of a series of articles published in the *Journal of Chemical Education*. Illustrations collected by F. B. DAINS. III+363 p. Easton, Pa., MACK, 1933. ISIS

This interesting book will be of value to every teacher of general chemistry and to every student of the history of science. It is a cross section of the history of inorganic chemistry in which the cultural backgrounds of the various discoveries are clearly indicated. Its usefulness is increased by a systematic chronology and an excellent index. It is profusely illustrated with portraits, many of them new of contemporary chemists, facsimiles of title-pages, letters, etc., and pictures of historic places and apparatus. It is up to date, containing accounts of the discoveries of the newest elements and of the methods by which they have been made. The price of the book, paper-bound $1.50, cloth-bound $2.00, is remarkably low for the reason that the type, etc. had already been set up for use in the *Journal of Chemical Education*. We are grateful to the publishers for making this material available to a more general circle of readers. T. L. D.

Winderlich, R. Les avatars d'une expérience de chimie. *Annales Guébhard-Séverine*, 6, 111-18, 1930. ISIS

Apropos of the preparation of iron sulphide used to illustrate the difference between a physical mixture and a chemical combination of iron and sulphur. W. shows the speciousness of that classical proof, and discusses the vicissitudes of the experiment itself: N. LEMERY, MARTIN LYSTER, NEWTON, PROUST, etc. A very interesting paper. A free copy of it may be obtained by writing to the Institut Guébhard-Séverine, 4, rue du Seyon, Neuchâtel (Suisse) and mentioning *Isis*. G. S.

26. — TECHNOLOGY

(For Mining, see 32. Geology; for Industrial chemistry, 25. Chemistry. See also Arts and crafts under 45)

Browne, Charles Albert. The origins of sugar manufacture in

America. I. A sketch of the history of raw cane-sugar production in America. II. A sketch of the history of sugar refining in America. *Jour. Chem. Education*, 10, 323-30, 421-27, 1933. ISIS

Clowes, G. S. Laird Sailing ships, their history and development as illustrated by the collection of ship models in the Science Museum. Part II. Catalogue of exhibits, with descriptive notes. 112 p. London, H. M. Stationery Office, 1932. ISIS

Reviewed by H. H. BOOTES, *Geographical Journal*, 80, 355-56, 1932.

Drachmann, A. G. Ancient oil mills and presses. 181 p., 41 ill. (Det Kgl. Danske Videnskabernes Selskat. *Archaeologisk-Kunsthistoriske Meddelelser*, 1, 1). Kopenhagen, 1932. ISIS

Kulisher, J. M. Invention of agricultural machinery in England and the United States during the industrial revolution. *Archives of the hist. of sc. and technol.*, 1, 133-57, 1933 (In Russian). ISIS

Loree, Leonor F. Locomotives! Past and present. An address delivered at the ninth annual American dinner of the Newcomen Society of England, held at New York, on April 24, 1933. 11 p., ills. American Locomotive Co., 1933. ISIS

Schuette, H. A.; Robinson, Francis J. Ice cream. *Jour. Chem. Education*, 10, 469-75, 1933. ISIS

Contains considerable material on the history of artificially cooled beverages and foods. T. L. D.

Taft, Robert. The beginning of liquid ammonia research in the United States. *Jour. Chem. Education*, 10, 34-39, 1933. ISIS

IV. — BIOLOGICAL SCIENCES
(Knowledge of organic nature)

27. — BIOLOGY
(Generalities, "natural history")

Bertalanffy, Ludwig von. Modern theories of development. An introduction to theoretical biology. Transl. and adapted from the German by J. H. WOODGER. x+204 p. London, Oxford University Press, 1933 ($2.75). ISIS

This is an emended translation of the author's *Kritische Theorie der Formbildung* (1928) in more precise form with additions of new matter. It is

a discussion and evaluation of current theories of development or theoretical embryology. It represents a rapidly growing field of interest, a competitor of genetics. Between the two there is as yet no concrete or experimentally based nexus, though both must be dealt with by every thoughtful biologist. The data from development as analyzed by experiment are here marshalled in support of the organismic point of view which is offered as a solution of the impasse between mechanism and vitalism.

Since the fundamental character of the living thing is its organization, the customary investigation of the single parts and processes, even the most thorough physico-chemical analysis, cannot provide a complete explanation of the vital phenomena. This investigation gives us no information about the coördination of the parts and processes in the complicated system of the living whole which constitutes the essential 'nature' of the organism, and by which the reactions in the organism are distinguished from those in the test-tube. The chief task of biology must be to discover the laws of biological systems to which the ingredient parts and processes are subordinate. This is regarded as the fundamental problem for modern biology. Since these laws cannot yet be formulated in physical and chemical terms, one is entitled to a biological formulation of them. The question of a final reducibility of such biological laws is of subordinate importance in view of the foregoing demand. Even without this final decision, the antithesis between mechanism and vitalism ceases to be a troublesome problem.

The investigation of these laws must proceed in two directions. On the one hand, the empirical rules of organic systems must be obtained from the concrete, especially experimental, data. And on the other hand, it must be the final aim of biology to derive the laws of organisms deductively from general assumptions—a task which will probably be aided by the new mathematical logic and today can only be undertaken in a fragmentary form.

The second part of the book reviews the problem of development as a foundation of theoretical biology; definitions; the machine theory and the foundation of developmental mechanics; vitalism; GOLDSCHMIDT's physiological theory of development; organic and inorganic form, including the crystal analogy and the Gestalt theory; the organismic theories; SPEMANN's doctrine of developmental organizers; the present-day picture of the developmental process; the historical character of the organism; and the system theory of the author. C. A. K.

Cahn, Théophile. Les phénomènes biologiques dans le cadre des sciences exactes. 20 p. Paris, HERMANN, 1933. ISIS

Florian, J. The early history of the cell theory. *Nature*, 130, 634-35, 1932. ISIS

Gardiner, J. S.; Tansley, A. G. The natural history of Wicken fen. Parts I-VI. 652 p. Cambridge, BOWES & BOWES, 1923-1932. ISIS

Reviewed by W. H. T. TAMS, *Natural History Magazine*, 3, 277-83, 1932. An area of 520 acres of fenland in primitive condition is held by the National Trust, and being within easy reach of Cambridge, affords an oppor-

tunity for intensive study of special biological and ecological problems.
C. W. A.

Lippmann, Edmund O. von. Urzeugung und Lebenskraft. Zur Geschichte dieser Probleme von den ältesten Zeiten an bis zu den Anfängen des 20. Jahrhunderts. VIII+136 p. Berlin, SPRINGER, 1933. (RM. 9.60). ISIS

Von LIPPMANN tells us in his *Vorrede* that the present book contains the most important part of the material on the history of opinions relative to the origins of life and the nature of the vital force which he has accumulated, incidentally to his other studies, during the past forty years and more. The book reports the opinions of men of science and of speculative philosophers from early antiquity to the beginning of the twentieth century. It mentions many beliefs that are quaint and curious—and is altogether interesting reading. The first and last paragraphs of the *Nachwort* sum up the author's conclusion: "Dass eine so bedeutsame und auf die Dauer nicht abzuweisende Frage wie die nach dem Ursprunge der Lebewesen die Menscheit seit den ältesten Zeiten immer wieder beschäftigte, kann nicht wundernehmen; Tatsache bleibt aber, dass die Arbeit, die die besten Geister seit fast zweieinhalb Jahrtausenden an ihre Lösung wandten, von geringem Erfolge begleitet war, dass die alten Gegensätze der Meinungen zeitweilig immer wieder auftauchten, wenn auch unter anders klingenden Namen, und dass sie sich zum Teil bis zur Gegenwart unverändert erhielten. Mit Recht bezeichnen daher auch v. HARTMANN, LIEBMANN, und noch neuerdings DIEPGEN und ZAUNICK das Problem von der Natur und Entstehung des Lebens als der Metaphysik zugehörig, und es wäre schon viel gewonnen, dränge diese Erkenntnis endlich auch bei den Naturforschern und Ärzten unserer Zeit allgemein durch. Sagt doch bereits kein Geringerer als GOETHE: 'Man kann in den Naturwissenschaften über manche Probleme nicht gehörig sprechen, wenn man nicht die Metaphysik zu Hilfe ruft — als dasjenige, was vor, mit, und nach der Physik war, ist, und sein wird." T. L. D.

Magnan, A. Premiers essais de cinématographie ultra-rapide. Exposés de morphologie dynamique et de mécanique du mouvement. I. 26 p. ill. Paris, HERMANN, 1932. ISIS

Étude des battements de l'aile d'oiseaux, d'insectes, faites au moyen de l'appareil HUGUENARD et MAGNAN (1931), qui permet 3000 vues par seconde.
L. G.

Magnan, A. Cinématographie jusqu'à 12.000 vues par seconde (avec application à l'étude du vol des insectes). Exposés de morphologie dynamique et de mécanique du mouvement. III. 20 p. ill. Paris, HERMANN, 1932. ISIS

Magnan, A. et Sainte-Laguë, A. Le vol au point fixe. Exposés de morphologie dynamique et de mécanique du mouvement. IV. 32 p. ill. Paris, HERMANN, 1933. ISIS

28. — BOTANY

(Agronomy, phytopathology, palaeobotany)

Combes, Raoul. Histoire de la biologie végétale en France. 169 p. *(Bibliothèque de philosophie contemporaine.)* Paris, ALCAN, 1933. ISIS

Combes, Raoul. Biologie végétale et vitalisme. Les cahiers rationalistes, 118-46, 1933. ISIS

Excellente vulgarisation de l'histoire de la biologie végétale depuis CÉSALPIN. J. P.

Gray, Lewis Cecil. History of agriculture in the southern United States to 1860. Assisted by ESTHER KATHERINE THOMPSON. With an introductory note by HENRY CHARLES TAYLOR. 2 vols. XIX+567 p.; IX+p. 571-1086. Washington, Carnegie Institution, 1933. ISIS

This is, so to say, a companion treatise to the *History of agriculture in the northern United States*, 1620-1860, by PERCY WELLS BIDWELL and JOHN I. FALCONER (1925; *Isis*, 8, 621). The point of view is economic rather than technological; yet the historian of botany and agriculture may find in it some grist for his own mill, and the more easily so because of an elaborate index. G. S.

Krumbiegel, Ingo. Die Akelei (Aquilegia). Eine Studie aus der Geschichte der deutschen Pflanzen. *Janus*, 36, 71-92, 129-145, 4 pl., 1932. ISIS

" Zu einer Zusammenstellung der Bedeutung, welche die Gattung Aquilegia in der Biologiegeschichte aufweist, führte als äusserlicher Grund die Beobachtung der häufigen Darstellung grade dieser Pflanze auf zahlreichen Bildwerken des Mittelalters. Der Überblick über die Vergangenheit der Akelei setzt damit die Reihe der Bearbeitungen fort, welche mehrere deutsche Pflanzen im Institut f. Gesch. d. Medizin, Leipzig erfahren haben. (*Lilium* und *Scilla* durch HIRSCHFELD, *Crocus* durch TSCHOLAKOWA, *Allium* durch HEYSER). Ausserhalb dieses Rahmens ist neuerdings auch der Fieberklee, *Menyanthes trifoliata L.*, bearbeitet worden, (STOUSLAND) sowie das Schöllkraut (*Chelidonium*) und die Päonie (*Paeonia*, SCHWARZ) und von älteren Darstellungen ist die Diss. über *Asparagus* von FRANZIUS zu nennen. Die Akelei nimmt insofern eine besondere Stellung ein, als sie weit mehr als andere Pflanzen im symbolischen Zusammenhang verwendet wurde und ihre Verwendung etwas regelloser und ungleichmässiger ist."

Maire, René. Les progrès des connaissances botaniques en Algérie depuis 1830. 227 p., 8 pl. (Collection du centenaire de l'Algérie). Paris, MASSON, 1931. ISIS

29. — ZOOLOGY

Balss, Heinrich. Zur Geschichte der Systematik der Wirbeltiere. *Archeion*, 15, 16-26, 1933. ISIS

Flint, W. P.; Metcalf, C. L. Insects, man's chief competitors. VIII+133 p., 12 figs. Baltimore, WILLIAMS & WILKINS, 1932. ($1.00). ISIS

This is a brief review of the present status of man's war on insects, with historical data on the grape phylloxera, fleas and plague, ox warbles, Hessian fly, periodical cicada, Colorado potato beetle, and the cotton boll weevil. C. A. K.

Krumbiegel, Ingo. Die Amphibienkenntnisse im ältesten Amerika, nebst einigen ornithologischen Bemerkungen. *Zoolog. Anzeiger*, 79, 250-56, 4 fig., 1928. ISIS

Krumbiegel, Ingo. Spirochäten in Säugetieren. *Zeitschrift für Säugetierkunde*, 3, 49-54, 1928. ISIS

Seurat, L. G. Exploration zoologique de l'Algérie de 1830 à 1930. 708 p., 16 pl. (Collection du centenaire de l'Algérie, 1830-1930). Paris, MASSON, 1930. ISIS

V. — SCIENCES OF THE EARTH

(Implying knowledge of both organic and inorganic nature)

30. — GEODESY

Berthelot, André. Sur l'unité de longueur employée dans les premières mesures de la circonférence terrestre. *C. R. Acad. des sciences*, 194, 1323-25, 1932. ISIS

Coast and geodetic survey. Centennial celebration of the United States coast and geodetic survey, April 5 and 6, 1916, Washington, D.C. 196 p., 45 fig. Washington, Government Printing Office, 1916. ISIS

Lallemand, Ch.; Prévot, E. Le nivellement général de la France de 1878 à 1927. XXXIV+664 p. Paris, Ministère des Travaux Publics, 1927. ISIS

Reviewed by Sir C. F. CLOSE, *Geographical Journal*, 80, 164-65, 1932. The review deals with some points in the history of precise levelling. C. W. A.

31. — GEOGRAPHY AND OCEANOGRAPHY

Dowson, Sir Ernest. Collection of cadastral survey and land records. *Geographical Journal*, 80, 93-94, 1932. ISIS

"It is hoped to build up, at the house of the Royal Geographical Society in London, a comprehensive and representative collection from all parts of the world, exemplifying work of this nature. It is intended to include land laws, regulations, and technical instructions, and that it shall be kept abreast with advances in cadastral survey and land records in each country."

C. W. A.

Fead, Margaret Irene. Notes on the development of the cartographic representation of cities. *Geographical Review*, 23, 441-56, 11 fig., 1933. ISIS

Gillespie, James Edward. A history of geographical discovery, 1400-1800. VIII+111 p. New York, HOLT, 1933 ($1.00). ISIS

This addition to *The Berkshire studies in European history* falls into three parts: I. The search for the Indies and Cathay; II. The exploration of the American Continent; III. Explorations in the Arctic Seas and the Pacific. It is a brief summary of some of the major explorations and voyages during the four centuries and an estimate of the economic, political, social, literary, religious, and intellectual effects of these discoveries. Not only geographical science was expanded by these explorations, but the natural sciences and medicine grew in importance in the learned world because of the stimulated curiosity of man. Collections of the natural products, of the flora and fauna, of the minerals, and of ethnological materials from distant lands vastly increased the wealth of natural knowledge and gave both aim and material for the orderly classification and description of natural objects. The author fails to note the importance of the fur trade in rivalries in the English, Spanish, and Russian voyages to the Northwest coast.

C. A. K.

Marguet, F. Histoire de la navigation du XV^e^ au XX^e^ siècle. 301 p., ill. Paris, Société d'éditions géographiques, maritimes et coloniales, 1931. ISIS

Reviewed by L. SAPIN, *Isis*, 19, 235-37, 1933.

Talman, C. F. "Wind-blowers." (Query no. 22). *Isis*, 19, 503, 1933. ISIS

32. — GEOLOGY, MINERALOGY, PALAEONTOLOGY, MINING

(For palaeobotany, palaeozoology and palaeoanthropology, see respectively 28. *Botany*, 29. *Zoology, and* 39. *Prehistory)*

Dive, P. La dérive des continents et les mouvements intratelluriques. Préface de EMILE PICARD. 58 p., ill. Paris, DUNOD, 1933. ISIS

Hotchkiss, W. O. The story of a billion years. x+137 p., 8 figs. New York, Century, 1932 ($1.00). ISIS

This volume in the *Century of progress* series is a succint survey of current geological concepts of the processes involved in geologic changes, of the origin and age of the earth, of the succession of living forms, of the climates of the past, and of the great ice age. The relative significance and value of geologic resources are estimated. There is a useful summary of important geological discoveries in the last century and a forecast of geologic change in the future. C. A. K.

Laforge, Laurence. Geology of the Boston area Massachusetts. v+105 p., 15 pl., 6 fig., maps. *Geological Survey*, Bulletin 839, United States Government Printing Office, Washington, 1932. (40 cts.). ISIS

Historical sketch (p. 4-7) and reproduction of the earliest geologic map of the Boston district, 1818. G. S.

Willis, Bailey. Earthquakes in the Holy Land : a correction. *Science*, 77, 351, 1933. See *Isis*, 20, 580. ISIS

VI. — ANTHROPOLOGICAL AND HISTORICAL SCIENCES
(Knowledge of man, past and present)

34. — ANATOMY

Barbosa Sueiro, M. B. La contribution des scientistes de Lisbonne à l'étude de l'anatomie comparée. *Arquivo de anatomia e antropologia*, 14, 437-51, 1932. ISIS

Krammer, Ludwig. Streit und Widerstreit um die Beweiskraft der Lungenschwimmprobe in geschichtlicher Darstellung. *Sudhoffs Archiv für Geschichte der Medizin*, 26, 253-76, 1933. ISIS

Sigerist, H. E. and others. An exhibit illustrating the history of anatomy. *Bulletin of the Institute of the History of Medicine*, 1, 193-234, 10 pl., 1933. ISIS

37. — PSYCHOLOGY
(Human and comparative)

Saussure, Raymond de. Psychologie de la pensée scientifique. *Annales Guébhard-Séverine*, 7, 151-55, 1931. ISIS

A free copy of this paper may be obtained by writing to the Institut Guébhard-Séverine, 4, rue du Séyon, Neuchâtel (Suisse) and mentioning *Isis*.

Wenzl, Aloys. Das Leib- und Seeleproblem im Lichte der neueren Theorien der physischen und seelischen Wirklichkeit. IV+104 p. Leipzig, MEINER, 1933. ISIS

38. — ARCHAEOLOGY
(Generalities, methods)

Azais, R. P.; Chambard, R. Cinq années de recherches archéologiques en Ethiopie, province du Harar et Ethiopie méridionale. Préface par EDMOND POTTIER. 2 vols. XV+348 p., 6 pl., map; atlas, 110 pl. Paris, GEUTHNER, 1931. ISIS

Reviewed by GEORGE SARTON, *Isis*, 19, 516-18, 1933.

39. — PREHISTORY

Clark, Grahame; Piggott, Stuart. The age of the British flint mines. *Antiquity*, 7, 166-83, 10 fig., 1 pl., 1933. ISIS

Including a distribution map of European flint mines. G. S.

Lowie, Robert H. HUGO OBERMAIER's reconstruction of sequences among prehistoric cultures in the old world. *Methods in Social Science*, ed. by RICE (University of Chicago Press, 1931), 266-74. ISIS

Müller, Rolf. Die astronomische Bedeutung des Mecklenburgischen "Steintanzes" bei BÜTZOW. *Praehist. Z.* 22, 197-202, 1931. ISIS

Saint-Périer, René de. L'art préhistorique (époque paléolithique). 76 p., 60 pl. Paris, RIEDER, 1932. ISIS

Smith, Reginald A.; Hulme, E. Wyndham. Currency bars and water-clocks. A reply and a rejoinder. *Antiquity*, 7, 210-15, 1933. ISIS

Toutain, J. Essai de mise au point des données de l'archéologie préhistorique sur l'ethnographie de la Gaule. *L'ethnographie*, 9-18, 15 avril 1932. ISIS

Wimmer, Friedrich. Der erste Fund von Hohlmassen in der Urgeschichte. *Forsch. u. Fortschr.*, 9, 74-75, 1 fig., 1933. ISIS

40. — ETHNOLOGY
(Primitive and popular science).

Castagné, J. La personnification des éléments chez les Kazak-Kirghiz. *L'ethnographie*, 51-60, 15 avril 1932. ISIS

Forbes, Robert H. The black man's industries. *Geographical Review*, 23, 230-47, 21 fig., 1933. ISIS

"The native African negro, far from being the stark savage of common imagination, is the possessor of varied though crude cultures to which in some respects civilized peoples are deeply indebted. These cultures, which vary greatly with local environment, though in some details derived from outside sources, are mainly indigenous and are the net result of raw materials locally available, the needs of isolated peoples, and the ingenuity of these peoples in adapting materials at hand to the satisfaction of their living requirements." Contents: Iron industries; Metallurgical practice in the Haute Volta; Age of native smelting industry; Boat carpentry; Cotton cultivation and manufacture; The Calabash industry; Rice cultivation; A complex semicivilization. "Whether his ancient semicivilization is relict from some Eden of Pleistocene time, when the Sahara was a grassy plain and its central highlands were the sources of great rivers, or whether it represents a slow emergence from stark savagery is a matter for interesting speculation."

Jochelson, Waldemar. History, ethnology and anthropology of the Aleut. v+91 p., 27 fig. Carnegie Institution of Washington, 1933. ISIS

This is a supplement to the archaeological report by the same author published by the Carnegie Institution in 1925. Contents: 1. History of the discovery of the Aleutian Islands, Description; 2. The Aleut; 3. Economic activities of the Aleut; 4. Cultural activities of the Aleut, Grass work of Aleut women, Grasses for weaving, Edible roots and grasses, Games, Ornamental figures and their Aleut names; 5. Relationship system of the Aleut; 6. Mythology of the Aleut; 7. Physical types; 8. Measures of time and space, The seasons, Aleut measures, Cardinal points; Bibliography.

G. S.

Lévy-Bruhl, L. La numération chez les Bergdama. *Africa*, 2, 162-73, 1929. ISIS

Lowie, Robert H. The buffalo drive and an old-world hunting practice. A cultural parallel between the Lapps and the North American Indians. *Natural History*, 23, 280-82, 1923. ISIS

Lowie, Robert H. The family as a social unit. *Papers of the Michigan Academy of Science, Arts and Letters*, 18, 53-69, 1932. ISIS

Lowie, Robert H. A women's ceremony among the Hopi. *Natural History*, 25, 178-83, illus., 1925. ISIS

Marinus, Albert. La cartographie du folklore. L'Annuaire 1931 1932 de la Soc. Luxembourgeoise d'études linguistiques et dialectologiques, 71-82. ISIS

Marinus, Albert. Le folklore descriptif. *Le Folklore Brabançon*, 12, no. 69, 19 p., Bruxelles, 1932. ISIS

Marinus, Albert. Folklore et science. *Assoc. franç. p. l'avanc. des sciences*, 320-21, 1932. ISIS

Marinus, Albert. Les glissements explicatifs dans le folklore. *Le Folklore Brabançon*, 12, no. 72, 38 p., illus., 1933. ISIS

Nieuwenhuis, A. W. Urformen des naturwissenschaftlichen Denkens und der Naturauffassung auf dem amerikanischen Festlande. *Janus*, 37, 84-96, 122-28, 153-60, 1933. ISIS

Rühle, Oskar. Sonne und Mond im primitiven Mythus. 48 p. (*Philosophie und Geschichte*, 8). Tübingen, MOHR, 1925. ISIS

Schebesta, Paul. Bambuti, die Zwerge vom Kongo. Leipzig, BROCKHAUS, 1932. ISIS

Contient (p. 212 sq.) des indications sur la numération des Efé (pygmées). J. P.

Stone, Eric. Medicine among the American Indians. XV+139 p., 17 illus. (*Clio Medica* series). New York, HOEBER, 1932. ISIS

Reviewed by C. D. LEAKE, *Isis*, 19, 247-48, 1933.

Wright, Jonathan. Medicine of primitive man — XXII. *Medical Life*, 40, 305-52, 1933. ISIS

Zinner, E. Zur altamerikanischen Astronomie. (Eine Erwiderung auf Herrn LUDENDORFFs Entgegnung). *Vierteljahrsschrift der astronomischen Gesellschaft*, 68, 97-102, 1933. ISIS

44. — HISTORY OF CIVILIZATION

(General history, historical methods, biography and chronology)

Biographie Nationale publiée par l'Académie royale de Belgique. Tome vingt-cinquième. 2e fascicule (TOSNY-VYTTERSPROT). Bruxelles, 1932. ISIS

Ce 2e fascicule complète le tome 25 de la *Biographie Nationale*, dont la publication fut commencée en 1866. Le t. 25 contient, dans le domaine de l'histoire des sciences, des notices dues à L. FREDERICQ, B. LEFEBVRE (notice sur ANTOINE THOMAS), PAUL MANSION et F. VAN ORTROY. J. P.

Caron, Pierre ; Stein, Henri. Répertoire bibliographique de l'histoire de France . T. IV (1926 & 1927). 480 p. Paris, RIEDER, 1933. ISIS

Kammerer, Albert. La mer Rouge. L'Abyssinie et l'Arabie depuis l'antiquité. Introduction par M. G. HANOTAUX. Tome premier : Les pays de la mer Érythrée jusqu'à la fin du moyen âge. XXV+451 p., 112 pl., 41 fig. *Mémoires de la société royale de géographie d'Egypte*, 15. Le Caire, 1929. ISIS

Première partie — Alexandrie et l'Erythrée; Deuxième partie — Arabie; Troisième partie — Abyssinie.

Lebrun, Gaston. Grandes figures de la Belgique indépendante. 1830-1930. Bruxelles, BIELEVELD, 1930. ISIS

Mémorial publié sous la direction de GASTON LEBRUN. La première partie (Sciences mathématiques, physiques et naturelles) de la 5e Section comporte une introduction et 23 biographies par LUCIEN HAUMAN. J. P.

47. — HISTORY OF MORALS
(Moral organization of society)

Bayet, Albert. La morale de la science. 139 p. Paris, Les Presses Universitaires de France, 1931. ISIS

Reviewed by J. PELSENEER, *Isis*, 19, 241-45, 1933.

Bergson, Henri. Les deux sources de la morale et de la religion. 348 p. Paris, ALCAN, 1932. ISIS

Reviewed by L. G., *Isis*, 19, 240, 1933.

Cresson, André. Le problème moral et les philosophes. 204 p. Collection ARMAND COLIN. Paris, COLIN, 1933. ISIS

La philosophie générale s'est développée autour de deux groupes généraux de problèmes : des problèmes théoriques, qui sont problèmes métaphysiques, et des problèmes pratiques, dont dépend la morale ou qui relèvent d'elle.

Dans " les systèmes philosophiques " (*Isis*, 15, 313), CRESSON avait dressé le tableau des types de doctrines que la philosophie a élaborées à propos des problèmes de métaphysique. En écrivant " le problème moral et les philosophes," il expose les théories des philosophes sur les problèmes pratiques. Il étudie successivement les doctrines gréco-latines de la sagesse terrestre (pp. 15-56); la morale judéo-chrétienne, ses structures philosophiques et les causes de sa décadence (57-103); et enfin ce qu'il appelle " les métamorales modernes " qui cherchent à la morale un fondement satisfaisant, en l'érigeant en science indépendante de toute métaphysique (106-157), et " les doctrines dissidentes " qui, considérant comme suranné le problème du fondement de la morale, se placent, pour le traiter, à un point de vue entièrement nouveau (SCHOPENHAUER, SPENCER, LÉVY-BRUHL). L. G.

48. — HISTORY OF PHILOSOPHY

(See also above 18. Philosophy of science)

Brunschvicg, Léon. De la connaissance de soi. 196 p. Paris, ALCAN, 1931. ISIS

Reviewed by PIERRE BRUNET, *Isis*, 19, 212-14, 1933.

49. — HISTORY OF RELIGION

(Science and religion)

Laignel-Lavastine, M.; Abadie, Alfred. Notes sur trois stigmatisés (VÉRONIQUE GUILLIANI, LUCIE DE NARNI et le Père PIE DE PIETRELEINA) étudiés objectivement par des contemporains. *Bulletin de la société française d'histoire de la médecine*, 27, 106-20, 1933. ISIS

Monod, Victor. Dieu dans l'univers. Essai sur l'action exercée sur la pensée chrétienne par les grands systèmes cosmologiques depuis ARISTOTE jusqu'à nos jours. 360 p. Paris, FISCHBACHER, 1933. ISIS

Mousson-Lanauze. Le symbolisme des forces naturelles aux temps mythologiques. *Bulletin de la société française d'histoire de la médecine*, 27, 147-56, 1933. ISIS

VII. — MEDICINE

50. — HISTORY, ORGANIZATION, AND PHILOSOPHY OF MEDICINE

András, Deési Daday. L'évolution de la science médicale en Hongrie. *Bulletin of the international committee of historical sciences*, 5, no. 19 (Seventh international congress of historical sciences, Warsaw, 1933), 353-70, 1933. ISIS

Diepgen, Paul. Deutsche Medizin und deutsche Kultur. *Deutsches Ärzteblatt*, Nr. 25, 20 p., 1933. ISIS

Diepgen, Paul. Wie stehen wir in der Medizingeschichte? *Praemedicus*, Nr. 21, 2 p., 1933. ISIS

Garrison, Fielding H. Persian medicine and medicine in Persia. A geomedical survey. *Bulletin of the Institute of the History of Medicine*, 1, 129-53, 1933. ISIS

Goulard, R. Médecins embastillés pour divers motifs. *Bulletin de la société française d'histoire de la médecine*, 27, 161-67, 1933. ISIS

Griaule, M. Le livre de recettes d'un dabtara abyssin. 180 p. (*Travaux et mémoires de l'Institut d'ethnologie*, 12). Paris, 1930. ISIS

Reviewed by GEORGES S. COLIN, *Hesperis*, 12, 135, 1931. "Il s'agit d'un recueil de recettes médicomagiques, analogue à ceux que l'on rencontre partout dans l'Afrique du Nord, à cette différence près que l'élément islamique est remplacé en Abyssinie par un élément chrétien."

Hasluck, F. W. (1878-1920). Observations on incubation. Christianity and Islam under the Sultans, vol. 2, 689-95, Oxford, 1929. ISIS

Howell, William Boyman. Medicine in Canada *(Clio medica)*. XIV+138 p. ill. HOEBER, New York, 1933. ISIS

L'auteur n'entend pas reprendre l'histoire de la médecine au Canada de J. J. HAEGERTY "Four centuries of medical history in Canada" (4 vols. 1928), ni l'histoire de la médecine dans la province de Québec écrite par H. S. BIRKETT en 1908, et par M. E. ABBOTT en 1931. Son objet est plus modeste : en donnant une place relativement large aux biographies des pionniers, il entend montrer les conditions dans lesquelles était pratiquée la médecine, et les relations des praticiens avec l'ambiance de leur époque. I. Le premier acte : arrivée de JACQUES CARTIER en 1535; le scorbut arrêté par absorption d'une décoction d'écorce de sapin; 2. Acadie : CHAMPLAIN (1604) a avec lui deux apothicaires : DANIEL HAY et LOUIS HÉBERT; 3. Québec : le même HÉBERT en 1616, ROBERT GIFFARD (1627) premier médecin de l'Hôtel-Dieu de Québec, fondé en 1639, JEAN MADRY (1651), MICHEL SARRAZIN (1685), JEAN FRANÇOIS GAULTHIER (1742); 4. Les pionniers de la médecine à Montréal : LOUIS GOUDEAU et JEAN POUPPÉ (1648), ETIENNE BOUCHARD chirurgien de l'Hôtel-Dieu de 1659 à 1670, JEAN MARTINET occupe la même fonction de 1680 à 1690, TIMOTY O'SULLIVAN=TIMOTHÉE SYLVAIN (1725-1730); 5. Médecine et ancien régime; 6. L'hôpital général de Montréal, fondé en 1694; 7. Hôtel-Dieu de Montréal : 8 octobre 1644; 8. Deux chirurgiens de l'armée de l'ancien régime : ANDRÉ ARNOUX venu au Canada en 1749, et PHILIPPE LOUIS FRANÇOIS BADELART (1747); 9. Nouvelle-Écosse : ALEXANDRE ABERCROMBIE (1775); 10. Le nouveau régime à Québec : ADAM MABANE (1762), LATHAM introducteur de la vaccination au Canada; 11. L'instruction médicale à Québec : FRANÇOIS BLANCHET (1823); 12. Montréal : faculté de médecine de McGill College, 1829; 13. JAMES DOUGLAS (1800-1886); 14. Choléra et typhus au Canada durant le XIX^{e} siècle; 15. Les premiers médecins de l'Ontario; 16. JOHN ROLPH et l'instruction médicale: J. ROLPH († 1879); 17. The Toronto general hospital, fondé en 1820; 18. L'instruction médicale à Kingston; 19. La médecine dans les provinces agricoles; 20. JOHN CHRISTIAN SCHULTZ († 1896); 21. Colombie Britannique; 22. ARCHIBALD MENZIES (1754-1896); 23. WILLIAM FRASER TOLMIE (1810-1842); 24. JOHN SEBASTIAN HELMCKEN (1825-). L. G.

Hurd-Mead, Kate Campbell. An introduction to the history of

women in medicine. I. Medical women before Christianity. *Annals of Medical History*, 5, 1-27, 16 fig.; 171-96, 5 figs.; 281-305, 9 fig., 1933. ISIS

(Medicine, history, congress, Bucarest 1932). Ninth International congress. Account and summaries. *Archeion*, 14, 537-48, 1932. ISIS

(Medicine, history, congress, Paris 1932). Journée annuelle parisienne. (Paris, 14 janvier). *Archeion*, 14, 548-9, 1932. ISIS

Meerloo, A. M. Het ziektebegrip in verleden en heden. (Een kort historisch overzicht). *Bijdragen tot de geschiedenis der geneeskunde*, 13, 136-50, 1933. ISIS

Oliaro, T. L'istituto di storia della medicina in Vienna. *Minerva medica*, 1, 18 p., 1933. ISIS

Description of the admirable Institute established in Vienna by MAX NEUBURGER, with 24 illustrations.

Packard, Francis R. History of medicine in the United States. Vol. 1, XXV+656 p., frontispiece, 66 pl.; vol. 2, XI+p. 657-1323, 36 pl. New York, HOEBER, 1931. ISIS

Reviewed by C. D. LEAKE, *Isis*, 19, 245-47, 1933.

Raynaud, Lucien; Soulié, Henri; Picard, Paul. Hygiène et pathologie Nord-Africaines, assistance médicale. 2 Vols. Vol. 1, 550 p., 44 pl., illus.; vol. 2, 613 p., 34 pl., map. (Collection du centenaire de l'Algérie, 1830-1930). Paris, MASSON, 1932. ISIS

Sigerist, Henry E. Die Geschichte der Medizin in ihrer Bedeutung für die Gegenwart. 4 p. Liječnički Vjesnik, br. 4, 1931. ISIS

Sigerist, Henry E. Introduction à la médecine. Trad. par MAURICE TÉNINÉ. Préface de F. GIDON. 356 p. Paris, PAYOT, 1932. ISIS

Reviewed by ALDO MIELI, *Archeion*, 15, 127-32, 1933.

Comme il fallait s'y attendre, l'introduction à la médecine ne peut être conçue par SIGERIST que comme une sorte de sociologie médicale faisant un appel constant à l'histoire de la médecine. Qu'il soit question de l'anatomie ou de la physiologie de l'homme normal, ou du malade, ou des signes de la maladie, ou de la maladie elle-même, de ses causes, de l'aide qu'y peut apporter le médecin, ou enfin du médecin lui-même en face des problèmes que lui pose sa fonction sociale, l'auteur remonte à l'origine historique, et indique l'évolution, dans des voies qui peuvent être très différentes, des points de vue, des doctrines, des méthodes. Ouvrage excellent, aussi bien d'ailleurs pour les médecins que pour les étudiants pour qui il a d'abord été parlé avant d'être écrit. Édition allemande, 1931 (*Isis*, 17, 611). L. G.

Sigerist, Henry E. Probleme der medizinischen Historiographie. Atti dell' VIII Congresso Internazionale di Storia della Medicina. Roma 22-27 Settembre 1930, 4 p. Pisa, LISCHI, 1931. ISIS

Sudhoff, Karl. Aus der Entwicklung ärztlichen Wissens. *Leipz. ill. Zeitung*, Nr. 4589, 224-28, 265, 1933. ISIS

Viets, Henry R. A brief history of medicine in Massachusetts. XIV+194 p., 8 pl. Boston, HOUGHTON MIFFLIN, 1930. ISIS

Reviewed by CHARLES A. KOFOID, *Isis*, 15, 388-91, 1931.

Weinberger, Bernhard Wolf. The cause of errors in dental history. A reply to articles by J. BEN ROBINSON and L. PARMLY BROWN relating to HORACE H. HAYDEN and JOHN HARRIS. *Dental Cosmos*, 16 p., April 1933. ISIS

51. — EPIDEMIOLOGY, HISTORY OF SPECIAL DISEASES. PUBLIC HEALTH AND SOCIAL MEDICINE.

Bryan, Joseph Hammond. The history of laryngology and rhinology and the influence of America in the development of this specialty. *Annals of Medical History*, 5, 151-70, 13 figs., 1933. ISIS

Celli, Anna. I riferimenti alla "febbre palustre" nella poesia. *Atti della Società italiana di storia delle science med. e nat.*, IV congresso nazionale, 5-12, 1933. ISIS

Jeanselme, E. Histoire de la syphilis : son origine, son expansion. 432 p., 58 fig. (Extraite du *Traité de la Syphilis*, T. 1.) Paris, DOIN, 1931. ISIS

Reviewed by C. D. LEAKE, *Isis*, 19, 249-52, 1933.

Jones, Harold W.; Tocantins, Leandro M. The history of purpura hemorrhagica. *Annals of Medical History*, 5, 349-59, 1 fig., 1933. ISIS

Major, Ralph H. Classic descriptions of diseases. With biographical sketches of the authors. XXVII+630 p., 127 ills. Springfield, Ill., THOMAS, 1932. ISIS

Reviewed by H. R. VIETS, *Isis*, 19, 518-20, 1933.

Schachter, M. L'histoire de l'hémophilie : quelques précisions. *Bulletin de la société française d'histoire de la médecine*, 27, 101-05, 1933. ISIS

Shaw, Manley Bradford. A short history of the sweating sickness. *Annals of Medical History*, 5, 246-74, 10 fig., 1933. ISIS

Sudhoff, Karl. Grosse Aerzte in der Entwicklung der Hygiene. Eine Rückschau. 6 p. Aus: *Das Deutsche Hygiene-Museum. Festschr.*, 1930. ISIS

Van Schevensteen, A. F. C. Over pestepidemien te Antwerpen in vroeger tijden. *Koninklijke Vlaamsche Academie voor Taal- en Letterkunde, Verslagen en Mededeelingen*, 1055-92, November, 1932. ISIS

Van Schevensteen, A. F. C. Les traités de pestilence publiés à Anvers. Essai de bibliographie. 102 p., 33 reproductions. Anvers, DE COKER, 1931. ISIS

Pour les travaux antérieurs du même auteur voir mon compte rendu avec longue bibliographie (*Isis*, 22,). La présente étude, fort précieuse, est limitée aux traités de pestilence publiés par des médecins anversois ou imprimés à Anvers. Ces traités sont décrits dans l'ordre chronologique, et les descriptions sont accompagnées de facsimilés. Le point de départ est fourni par les publications parues à Anvers en 1529 à la suite de l'épidémie de suette anglaise. Depuis lors l'auteur nous a donné un mémoire spécial sur le principal traité de 1529 avec un facsimilé intégral de celui-ci (voir plus haut dans la section XVI(1)D). Le dernier traité analysé date de 1663. G. S.

52. — HISTORY OF HOSPITALS, OF MEDICAL TEACHING, AND OF THE MEDICAL PROFESSION

Bijl, W. F. Th. van der. Uit de geschiedenis der chirurgijn3-gilden in Zeeland. *Bijdragen tot de geschiedenis der geneeskunde*, 13, 110-28, 1933. ISIS

(" Blockley," Philadelphia). Articles on the Philadelphia General Hospital by R. J. HUNTER, J. F. STOUFFER, W. E. ROBERTSON, MOSES BEHREND, J. W. MCCONNELL. *Medical Life*, 40, 259-84, ill., 1933. ISIS

Clark, Jefferson H. The development of a pathological laboratory at Blockley. *Medical Life*, 40, 237-52, ill., 1933. ISIS

Cumming, Hugh S. The municipal general hospital of the future and its relation to public health. *Medical Life*, 40, 158-62, 1933. ISIS

Englert, Ludwig. Die politische Erziehung des Arztes. *Deutsches Ärzteblatt*, Nr. 2, 8 S., 1933. ISIS

Hellinga, G. De Amsterdamsche gasthuizen, beoordeeld door vreemdelingen. *Bijdragen tot de geschiedenis der geneeskunde*, 13, 85-99, 2 pl., 1933. ISIS

Hellinga, G. De beteekenis van het Amsterdamsche St. Pietersgasthuis voor het ontleedkundige onderwijs in ons land, in vroeger tijden. Voorwoord door M. W. WOERDEMAN. *Bijdragen tot de geschiedenis der geneeskunde*, 13, 157-69, 1933. ISIS

Krumbhaar, E. B. The history of pathology at the Philadelphia General Hospital. *Medical Life*, 40, 162-77, 1933. ISIS

McFarland, Joseph. The history of nursing at the Blockley Hospital. *Medical Life*, 40, 177-91, 1933. ISIS

Middleton, William Shaine. Clinical teaching in the Philadelphia Almshouse and Hospital. *Medical Life*, 40, 191-200, 207-25, 1933. ISIS

Riesman, David, and others. "Old Blockley." I. Proceedings of the bi-centenary celebration of the building of the Philadelphia almshouse. *Medical Life*, 40, 99-149, 3 pl., 1933. ISIS

Sérieux, Paul; Libert, Lucien. Une maison d'aliénés et de correctionnaires sous l'ancien régime. La Charité de Château-Thierry. (D'après des documents inédits). *Bulletin de la société française d'histoire de la médecine*, 27, 23-43, 1933. ISIS

Stengel, Alfred. The importance of the Philadelphia General Hospital in medical education. *Medical Life*, 40, 153-56, 1933. ISIS

53. — PHARMACY. PHARMACOLOGY. TOXICOLOGY.

Hasluck, F. W. (1878-1920). Terra Lemnia. Christianity and Islam under the Sultans, vol. 2, 671-88, Oxford, 1929. ISIS

VIII. — EDUCATION

(The methods of accumulating, imparting and diffusing knowledge)

56. — BIBLIOGRAPHY

(Methods, libraries)

(Isis nos. 56 and 57, vol. XIX, 2, p. 321-472; 3, 473-621). Bruges,

June 1933 ; Sept. 1933. These numbers are analyzed in the 39th bibliography. Every previous number has been analyzed in previous bibliographies. G. S. ISIS

Peetersen-Fontainas, J. Bibliographie des impressions espagnoles des Pays -Bas. Préface de MAURICE SABBE. 260 p. Paris, DROZ, 1933. ISIS

Bibliographie des 1478 vol. espagnols imprimés dans les Pays-Bas aux XVI[e] et XVII[e] siècles.

58. — CATALOGUES OF SECOND HAND BOOKS ON THE HISTORY AND PHILOSOPHY OF SCIENCE

Art ancien, S. A., L'. Early books. Short list 3, 75 p., Zurich, 8 Pelikanstrasse, 1933. ISIS

Contents : Medicine and natural sciences, mathematics, travels, geography, etc., varia.

Blanchard, Louis. Catalogue d'ouvrages d'occasion sur la physique et la chimie. 46 p. Paris (5[e]), 10, rue de la Sorbonne, 1932. ISIS

Fock, Gustav. Prëhistorie. Eine Sammlung von Zeitschriften, Büchern und Monographien zum Teil aus dem Besitze von H. MOETEFINDT. Katalog Nr. 679, 33 p. Leipzig C 1, Schlossgasse 7-9, 1933. ISIS

Fock, Gustav. Reine und angewandte Mathematik enthaltend Zeitschriften, Bücher und Monographiensammlungen aus dem Besitze von E. HILB-Würzburg, AD. KNESER-Breslau u. O. HOPPE-Göttingen. Antiquariatskatalog Nr. 659. 128 p. Leipzig C. 1, Schlossgasse 7-9, 1932. ISIS

Gamber, J. Histoire du droit. Catalogue no. 150. 100 p. Paris, 7 Rue Danton, 1929. ISIS

Gamber, J. Philosophie, Catalogue no. 163. 40 p. Paris, 7, Rue Danton, 1932.

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Halle, J. Wertvolle neue Erwerbungen. Katalog 74. 72 p. München, Ottostrasse 3a. ISIS

Heffer & Sons Ltd. Catalogue of scientific books and publications of learned societies, no. 404, 84 p. Cambridge, Eng., 3 & 4 Petty Cury, 1933. ISIS

Heffer and Sons Ltd. A collection of books on anthropology, ethnology, comparative and non-Christian religions and philosophy, folklore, etc. No. 406. 70 p. Cambridge, England, 3 & 4 Petty Cury. 1933. ISIS

Hermann & Cie. Entomologie. Catalogue no. 135. 80 p., Paris (Ve) 6, rue de la Sorbonne. ISIS

Hermann & Cie. Mathématiques. Catalogue No. 139. Partie IV. Mécanique et physique mathématique. Balistique. Mécanique ondulatoire. Relativité. 48 p. Paris (Ve) 6, rue de la Sorbonne. ISIS

Hirsch, Emil (Antiquariat). Bibliotheca occulta et philosophica. Sammlung Baron C. Du Prel. Mit Vorwort v. Hans Ludwig Held. Katalog 58. 104 p. München 2 NW, Karolinenplatz 2.

Junk, W. Cryptogamae. Catalogue no. 83. 58 p. Berlin W. 15, Sächsische Str. 68, 1933. ISIS

Lier, R. Early books on medicine and natural sciences. Bulletin 18, 16 p. Florence, Italy, Via di Barbacane, 19, 1933. ISIS

Maggs Bros. Medicine, magic and natural sciences. Catalogue no. 582, 236 p., frontispiece. London, W., 34 & 35 Conduit Street, New Bond Street, 1933. ISIS

A very beautiful catalogue containing a good many facsimiles and critical notes; well indexed. Divided into 4 parts : 1. Books; 2. Important medical documents signed by Queen Isabella of Spain, the patroness of Christopher Columbus; 3. Medical portraits; 4. Medical autographs.

Nourry, Emile. Médecine ancienne. Anatomie-chirurgie, chimie et alchimie, sciences anciennes. Catalogue no. 50, Paris (Ve) 62, rue des Ecoles, 1933. ISIS

Quaritch, Bernard. A catalogue of books on zoology and geology including a selection of works from the important entomological libraries of Ernest and Léon Candèze. No. 475, 160 p. London, W. 1, 11 Grafton St., New Bond St. 1933. ISIS

Quereuil, J. A. Botanique, préhistoire, sciences diverses, médecine

ancienne, art vétérinaire. Catalogue no. 88. 68 p. Paris, 35, rue Bonaparte, 1933. ISIS

Sotheran, Henry. Annotated catalogue of works on 1. meteorology and physical geography; 2. geology; 3. mineralogy, petrology, and crystallography; 4. rare and valuable works on mathematics, astronomy, physics, and chemistry. No. 837. 124 p., London, W. 1, 43, Piccadilly. 1933. ISIS

Taeuber & Weil. Optik. Microscopie. Liste 40. 22 p., 2 pl., facs. München, Barerstrasse 22. ISIS

Critical bibliography no. 39. *Isis*, vol. 21, 339-486, 1934. ISIS

This note is published at the end of our bibliography solely for the convenience of the scholars who cut out the whole or part of it, attach extracts to catalogue cards and classify them. By adding this note to the others they will be able to find out rapidly whether this particular bibliography has been analyzed or not. G. S.

60. — ERRATA. SERIES 29.

(For previous errata, see ISIS, 20, 616)

Introduction to the History of Science

Vol. 1, p. 252, PLUTARCH, 5 lines from end, A. O. PRICKARD (not PRICHARD).

p. 794, BULLIALDUS (not BULLIADUS).

Isis

Vol. 12, p. 550, KAYE, C. R., XII, 132-45 (not 132, 145).
Vol. 12, p. 557, MARTIN, A., XI, 267 (not 266).
Vol. 15, p. 564, CRUM, W. E. (not W. A.).
Vol. 15, p. 564, CRUMP, C. G., XIII, 571 (not 471).
Vol. 15, p. 581, HOWARD, H. E. (not HOWART).
Vol. 15, p. 584, JANSEN, W., XIII, 158 (not 198).
Vol. 15, p. 623, VOLTA, A., XV, 124-57 (not XIV).
Vol. 18, p. 571, HOMEM (not HOMEN). C. W. A.

A few other misprints are not mentioned in these *errata* because they are too obvious to cause any error or confusion. I wish to express my thankfulness to the readers who take the trouble to make the above-mentioned corrections in their set of *Isis* and the *Introduction*. I would advise them, after having accomplished that little task, to write their initials near mine at the bottom of this note to indicate that these and the previous errata have been taken into account.

These and the previous errata have been corrected by...

G. S.

Index of Authors Included in the Thirty-Ninth Bibliography

The Roman figures followed by (1) or (2) refer to the centurial classification (Part I). Thus, Comte, A., XIX (1) E means that a paper by Comte, A. is listed under nineteenth century, first half, subdivision E.

The Arabic figures refer to the historical and to the systematic classifications (Parts II and III) which are subdivided into sections numbered consecutively from 1 to 60. For instance, Dijksterhuis, E. J., 4, 20, indicates that papers by Dijksterhuis are listed in section 4 (Greece), and in section 20 (mathematics).

September 1933. FRANCES SIEGEL.

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